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HOW TO

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HO SCALE

EMD GP38 LOCOMOTIVE

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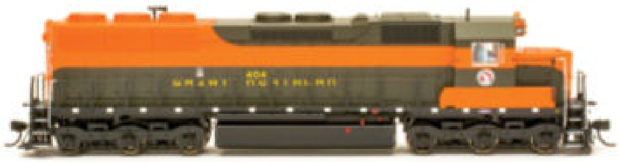

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On the cover: A switcher works the car float on Doug Kirkpatrick's new Virginian & Western Tidewater District.

Doug Kirkpatrick photo

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In July, learn how to model a diesel that's being stripped for parts. Plus, visit two HO scale layouts, see how a model railroad is set up for operations, and more!

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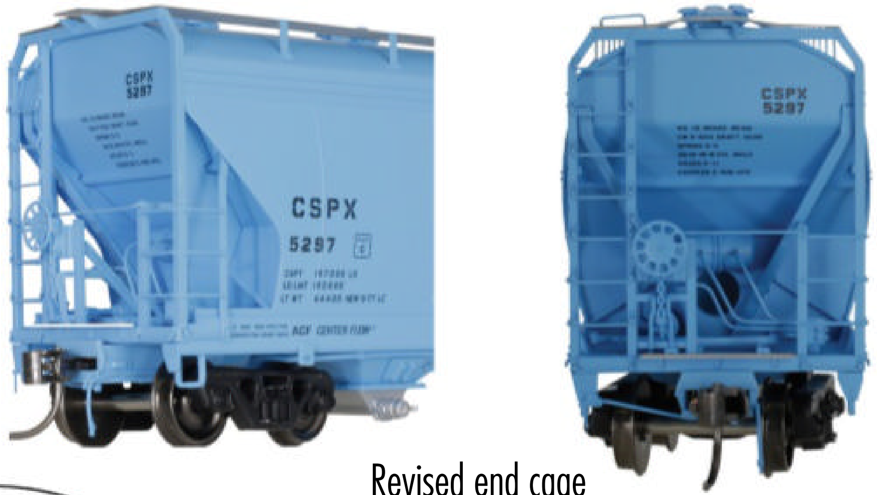
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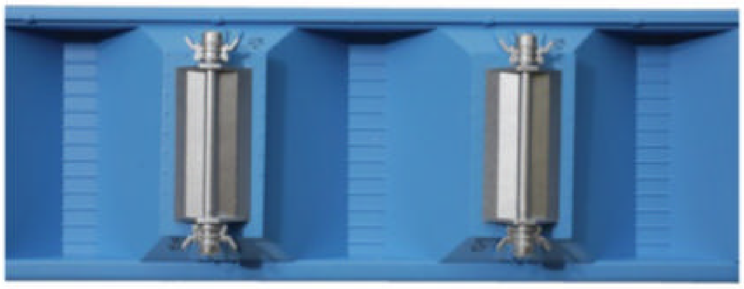

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In memoriam: Malcolm Furlow, 1946-2023

Malcolm Furlow was one of *Model Railroader*'s most popular authors of the 1980s. He later went on to become an internationally known artist. He's shown here at his ranch in Taos, N.M., in the early 2000s. Malcolm Furlow photo

Malcolm Furlow, noted model railroader and artist, died in early March from the effects of long COVID. He was 77 years old.

Though Malcolm had an American Flyer train set as a child, he didn't become interested in model railroading until later in life. Malcolm attended the University of Texas to pursue an art degree. He then spent nearly two decades as a professional musician, playing backup for The Beach Boys and Lou Rawls, among others.

Following his music career, Malcolm built movie sets and models for Walt Disney Studios. In 1977 Malcolm read a John Olson article about his HOn3 Mescal Lines, which sparked his interest in the hobby.

By the early 1980s Malcolm's byline was regularly appearing in the pages of *Model Railroader*. The articles often revolved around projects on his 10 x 10-foot HOn3 Denver & Rio Chama Western. When asked about his modeling philosophy in the July 1981 issue, Malcolm said, "Model railroading gives me a creative release, and it allows me to escape. I think it's good if you can stretch a hobby a little beyond the point of having fun. For me it fills a need for expression. Bull sessions with other modelers and operating sessions with friends help enrich the total, but I really enjoy getting away to the train room to work by myself for a couple of hours."

Within five years of entering the hobby, Malcolm had become one of the most recognized names in model railroading. At MR's 50th anniversary forum in Milwaukee in July 1983, he was on the dais with an all-star lineup of modelers and manufacturers, including Keith Gutierrez, John Armstrong, Bruce Chubb, Allen Keller, John Kunzie, Russ Larson, and Bruce Walthers.

Malcolm also became a regular in Kalmbach Video productions during this time. He appeared in *Building Model Railroad Scenery with the Experts* alongside John Olson, Dave Frary, and Jim Hediger. He shared more tips and techniques in *Weathering Railroad Models with Malcolm Furlow.*

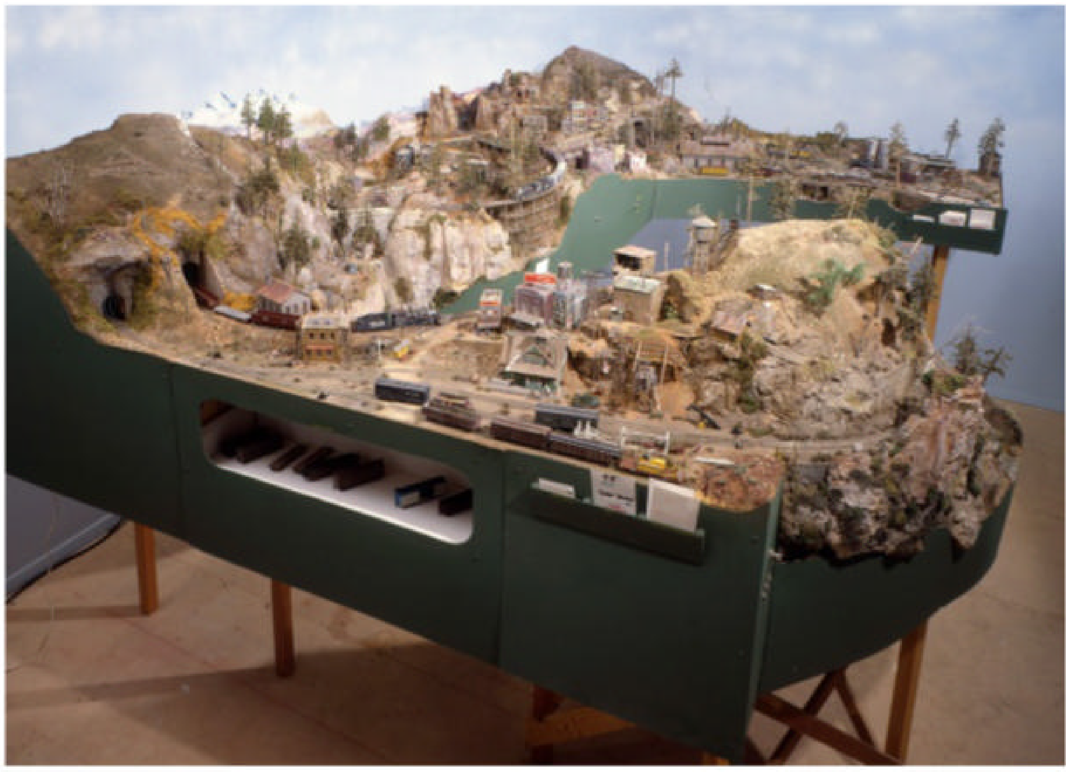
In addition to his HOn3 Denver & Rio Chama Western, Malcolm built the HOn3 San Juan Central. The 8 x 10-foot model railroad, now on display at The Magic of Scale Model Railroading exhibit at the California State Railroad Museum in Sacramento, was noteworthy as it was MR's first narrow gauge project layout. The articles ran from November 1983 to August 1984, skipping January 1984 (MR's 50th anniversary issue). The stories were compiled into the book *HO Narrow Gauge Railroad You Can Build.*

Malcolm's last major series for MR was the Carbondale Central project layout, which appeared in the January through March 1988 issues. The roughly 8 x 8-foot HO scale layout featured a railroad running through an urban setting. Though the layout packed a lot into a small space, the plan was designed for beginners and used sectional track.

Following a decade-long run in the hobby, Malcolm returned to his art roots and became an internationally known painter. "Malcolm is one of the most interesting characters I've ever known," MR's former editor and publisher Russ Larson wrote in the November 1998 issue. "He's a free spirit who's managed to make a living as a singer, musician, author, photographer, custom layout builder, and most recently as a Southwestern artist."

Malcolm's final MR byline, *Wild West Masterpiece*, was published in the September 2003 issue. In the article, he wrote about his *Ferrocarril de Rio Mantañas* layout. Malcolm built the 1:20.3-proportion model railroad at his ranch near Taos, N.M.

Visit Trains.com to see additional images showcasing Malcolm's modeling and photography. You can also watch some of his Kalmbach Video programs from the 1980s on our website. MR



Perhaps Malcolm's best-known work was the San Juan Central, a project layout he built for MR. The HOn3 model railroad was featured over multiple issues in 1983 and 1984. Today the layout is on display at the California State Railroad Museum in Sacramento. Malcolm Furlow photo

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By Eric White

Why I enjoy model railroad operations

Everyone is keeping an eye on the freight passing through Bagby on Jack Burgess's Yosemite Valley RR at the BayRails operating weekend in March. Operation brings people together to share the hobby and gives folks a chance to see and operate on well-known model railroads. Eric White photo

As I write this, I'm a week past returning from a long weekend of model railroad operations in the San Francisco Bay area. I had the distinct pleasure of operating on Jack Burgess's famous Yosemite Valley RR, shown above, along with other layouts that may someday share his layout's fame.

Seeing this beautifully designed and built layout was a highlight of the trip, but there are other aspects that draw me back to operating sessions repeatedly.

One of my favorite parts is the problem solving. Whether it's figuring out how to switch an industry or yard, or calculating the timing to get to a siding before another train is due to pass, there can be a lot of thinking going on in an operating session. My favorite jobs combine a bit of mainline running with some switching, so a turn or local is my first choice.

I also enjoy the social aspects of the events. After doing this for about years, I've come to look forward to seeing the people I've had fun operating with in the past.

Getting to see how people built their model railroads is another highlight. How did he fit this much railroad in his basement? How did he build this benchwork? It's another aspect of problem-solving.

Finally, it gives me an insight into how prototype railroads work by simulating the work they do. What's the purpose of signals, track warrants, timetables and train orders?

It's how the railroad gets trains safely and efficiently to their destinations. On a layout, it's unlikely to run into life or death situations, but no one wants to spend a Saturday stuck in a siding.

I know operating isn't for everyone, but if you're curious, opsig.org is a good place to learn and meet like-minded people. Check it out!

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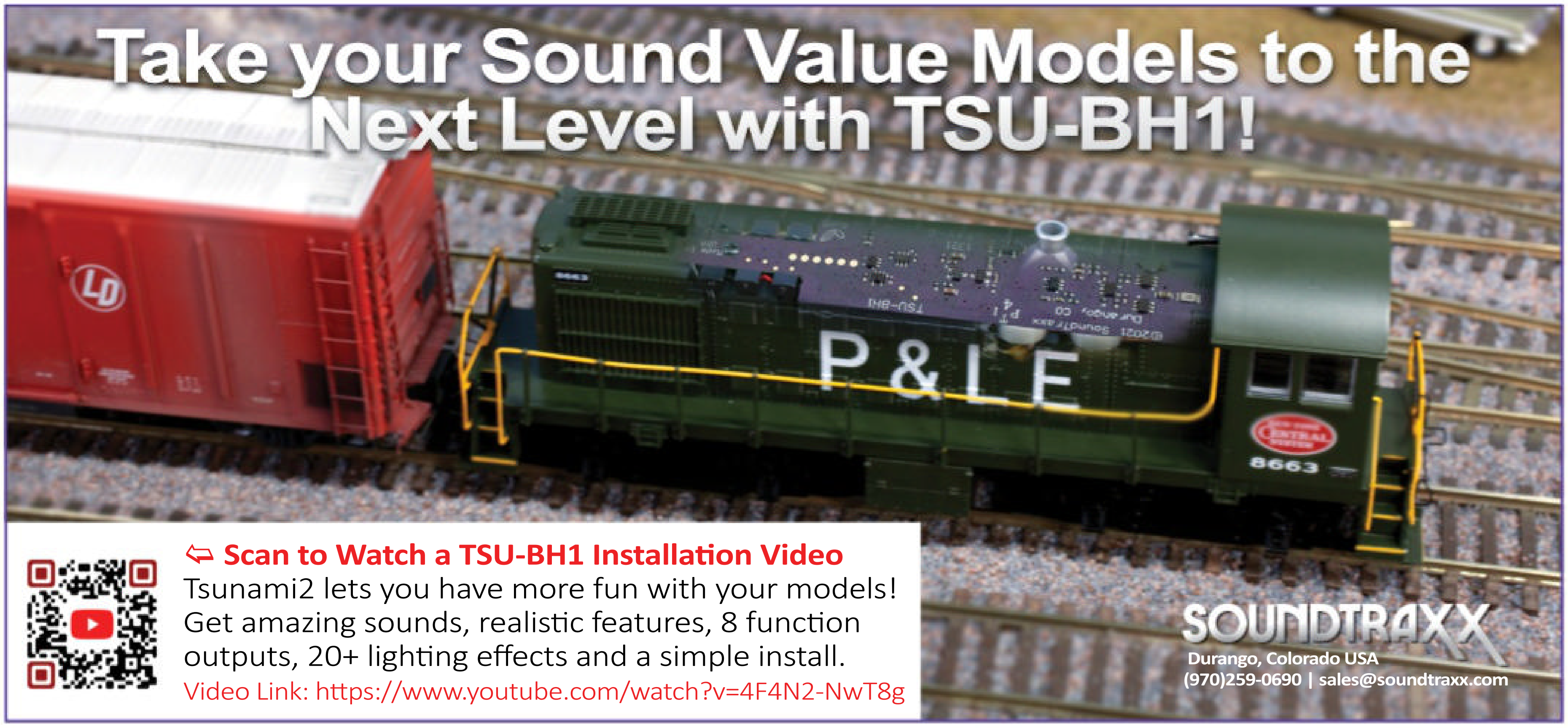

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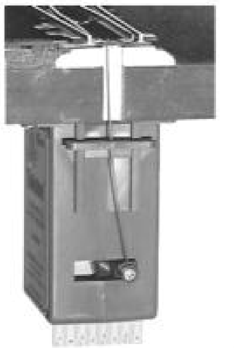

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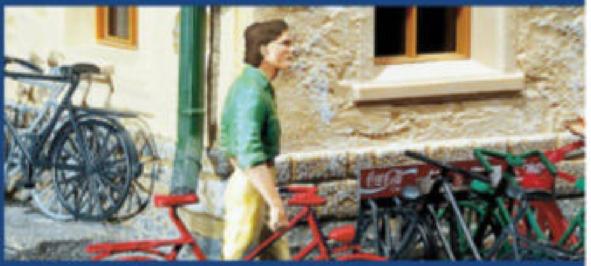

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HO scale

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General Electric U28C diesel locomotives. Atlas recently released these six-axle diesels decorated for Conrail (blue with "can opener" herald); Atchison, Topeka & Santa Fe (red and silver or blue and yellow U28CG); Louisville & Nashville (gray); Pennsylvania RR (Dark Green Locomotive Enamel); Southern Pacific (gray); and Union Pacific (Armour Yellow and Harbor Mist Gray). Each paint scheme is available in three road numbers. The units are also available undecorated. The U28C features road-specific details and factory-applied detail parts. Direct-current models ($189.95) have a pre-installed speaker. Models with an ESU LokSound decoder ($299.95) feature light-emitting diode lighting effects including Gyralight and Mars light where appropriate. Atlas Model Railroad Co., 908-687-0880, shop.atlasrr.com

The return of Broadway Limited's Stealth line

In March, Broadway Limited Imports announced the return of its Stealth line of models. Broadway Limited released some locomotives without sound under the Stealth line years ago, but discontinued them after poor sales. "We are excited to bring this option back into the hands of our modelers," said Bob Grubba, president and CEO of Broadway Limited Imports. "We have heard from our customers that they want DCC-ready models, and we are dedicated to providing them with top-notch products at a more affordable price point."

The first locomotive to be offered in Broadway Limited's Stealth line will be the Electro-Motive Division SD40. The locomotive will be offered decorated for Chesapeake & Ohio and nine other railroads.

The Stealth units will be DCC-ready with HO scale units featuring a 21-pin MTC socket and N scale units equipped with a 6-pin NEM651 socket for the modeler's choice of decoder. Locomotives with a dual-mode Paragon4 sound will also be available. According to Grubba, "diesels will still have all of the lights in them. The motherboard has all of the same connectors. The front and rear lights are directional. All of the other lights are either always on or they're not connected." Steam locomotives will have their lights connected but the smoke units will be removed.

The first product released in the stealth line will be the Electro-Motive Division SD40. The six-axle road unit will be offered in 10 paint schemes. An undecorated version with a low short hood will also be offered.

Manufacturer's suggested retail price for HO scale locomotives will be around $100 less than their sound-equipped counterparts. N scale locomotives with smoke will be around $70 less. Other models will be around $50 less.

After the SD40, plans are to release the HO scale GP35 and GP30 and Brass-Hybrid K2 in Stealth along with the N scale T-1 Duplex, F3, and F7 locomotives. For more information on the Stealth line, visit broadway-limited.com.

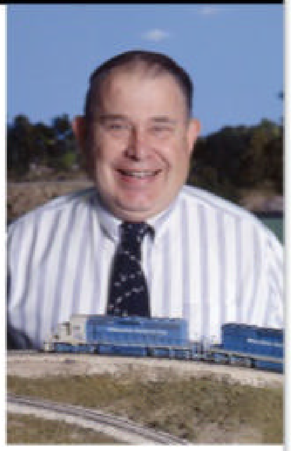
HO scale locomotives

- **Baldwin Centipede.** Pennsylvania RR (three A-A sets and two single A units); Baldwin demonstrator (one A-A set); National Railways of Mexico; Seaboard Air Line; and Union Pacific (two A-A sets). Two A units per scheme unless noted. ABS body with die-cast metal chassis. Factory-applied details such as handrails, grab irons, horn, bell, wipers, and etched-metal grills. Prototypical light operation including separately controllable light-emitting diode headlight, rear light, cab light, and number boxes. Built-in capacitor pack. Paragon4 dual-mode sound decoder with back-EMF. Minimum operating

Conducted by Bryson Sleppy

In Memoriam

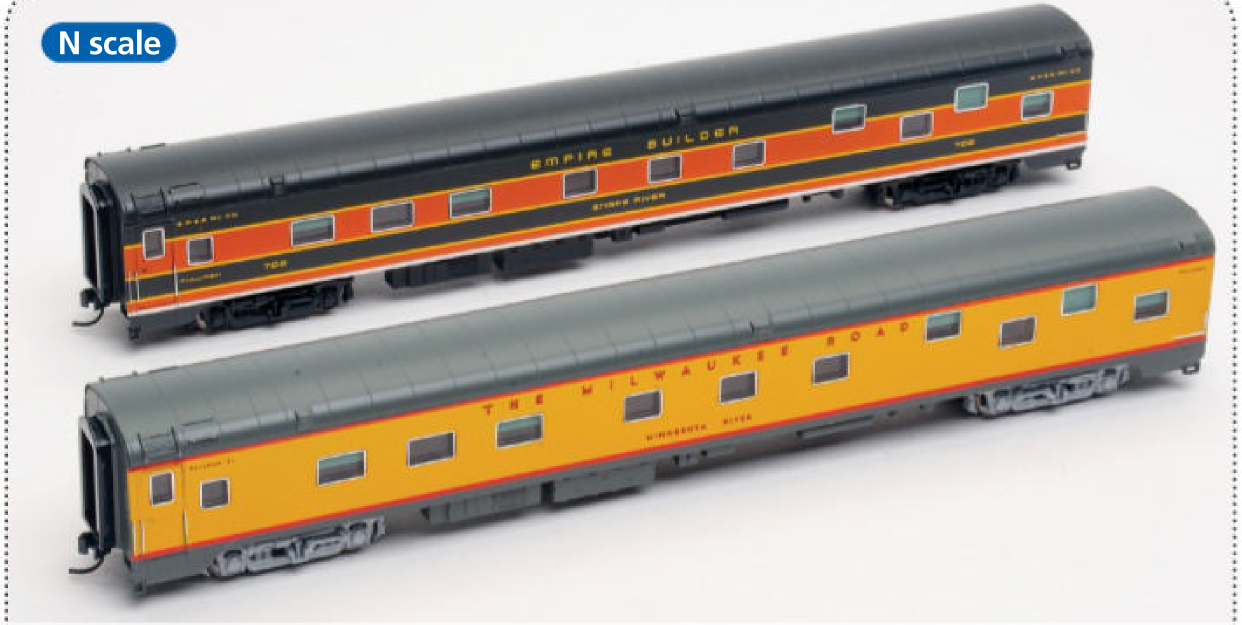
Laverne Bleifuss 1935-2023



Laverne Bleifuss, a long-time employee of Kalmbach Publishing Co., died on March 1. He was 87 years old.

LaVerne received his BA from the Layton School of Fine Arts. Afterward, he served four years in the United States Army. Following his service, he spent 40 years with Kalmbach Publishing Co. During that time he worked on *Model Railroader* and other Kalmbach magazines. It's estimated that he designed more than 3,000 articles for MR throughout his career. He retired as associate art director on April 28, 2000.

N scale



Pullman-Standard duplex sleepers. RailSmith has released these two N scale duplex sleepers decorated for Great Northern (*Empire Builder* scheme) and Milwaukee Road (Armour Yellow and Harbor Mist Gray). Other schemes are available. Each car features molded stirrup steps and grab irons along with sprung diaphragms on each end. Full underbody detail is included along with 36" metal wheels and truck-mounted couplers. Each car is priced at $47. RailSmith Models, lowellsmith.net

radius is 22". A unit, $329.99; A-A set, $599.99. Broadway Limited Imports, 386-673-8900, broadway-limited.com

- **Electro-Motive Division SD60M "Triclops."** Buffalo & Pittsburgh; Burlington Northern; Burlington Northern Santa Fe; Canadian Pacific; CSX; Hudson Bay Ry.; Union Pacific; and Webb Asset Management. Multiple road numbers per paint scheme. Road-number-specific details. Factory-applied details including windshield wipers, wire grab irons, uncoupling levers, m.u. stands, and trainline hoses. Prototype-specific bell placement. See-through cab window glazing and full cab interior (without crew figures). Light-emitting diode number boxes, classification lights, signal lights, and beacons where applicable. Direct-current model, $269.99; with dual-mode SoundTraxx Tsunami2 sound decoder, $369.99. Athearn Trains, 800-338-4639, athearn.com

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HO scale freight cars

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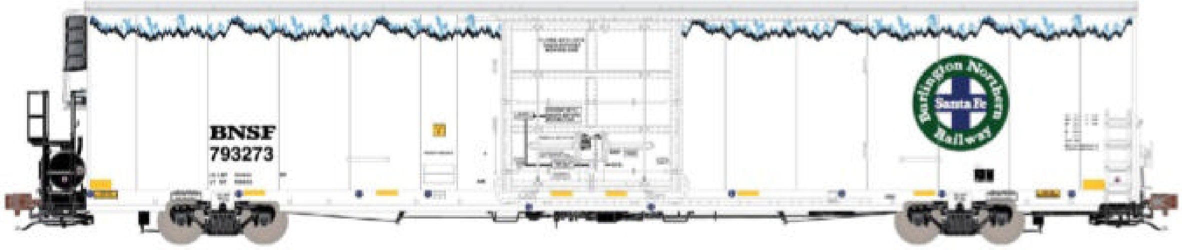
- **AAR 50-foot single door boxcar.** Northern Pacific; Chesapeake & Ohio; Halloween 2022 (one road number); National Railways of Mexico; Missouri Pacific; New York Central; and Reading Co. Two road numbers per scheme unless noted. Factory-applied ladders and grab irons. 8-foot and 9-foot Superior or Youngstown doors as appropriate. Detailed underframe. Straight, tabbed, or fish-belly side sill styles. Equipped with metal couplers and wheelsets. $52.95. Atlas Model Railroad Co., 908-687-0880, shop.atlasrr.com

HO scale
CANADIAN PACIFIC
5026

General Motors Diesel SD30C-ECO. This HO scale diesel locomotive is available decorated for Canadian Pacific in 12 road numbers. The modern-era locomotive includes factory-installed air hoses, windshield wipers, grab irons, uncoupling levers, and window glass. The locomotive rides on six-axle trucks with blackened metal RP-25 contoured wheels. Direct-current models sell for $239.95. Models with an ESU LokSound 5 sound decoder installed are $339.95. Bowser Manufacturing Co. Inc., 570-368-2379, bowser-trains.com

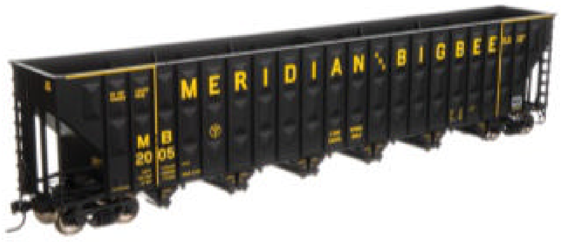
ScaleTrains HO Trinity 82-foot reefer



While attending the Rocky Mountain Train Show, ScaleTrains unveiled its HO scale Trinity 82-foot refrigerator car. The newly tooled model, never before offered as a ready-to-run model, will be offered in sound and non-sound versions. The cars will be fitted with Carrier or Thermo King (early or late) refrigeration units as appropriate.

Sound-equipped cars will also feature an operating light-emitting-diode-lighted control panel and capacitor circuit. Sounds can be turned on and off via a magnetic reed switch; the volume is adjustable. Each car features railroad, road number, and era-specific details including smooth or ribbed rooflines, refrigeration unit, and fuel tank variations, two side door types, underbody detail, and more. The reefer rides on detailed ASF 100-ton trucks with raised foundry data and rotating black Timken bearing caps.

The non-sound Trinity reefer is priced at $54.99 and the sound equipped car is priced at $89.99. For more information visit scaletrains.com.



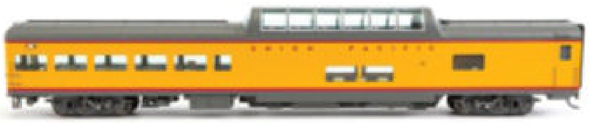
- **Greenville 7,000-cubic-foot wood chip hopper.** Meridian & Bigbee; CSX; Norfolk Southern; Atchison, Topeka & Santa Fe; Seaboard Coast Line; Southern Ry. (two paint schemes); and Union Pacific (with Missouri Pacific reporting marks). Four or six numbers per scheme. Also available undecorated. Interior bracing, door latch details, and die-cast metal underframe. Detailed brake gear. 100-ton trucks with 36" RP-25 contoured turned metal wheels. Proto-Max metal couplers. $39.98; undecorated, $34.98. WalthersMainline. Wm. K. Walthers Inc., 414-527-0770, walthers.com

- **Gunderson 53-foot well car.** Arkansas-Oklahoma RR; Canadian Pacific; Ferromex; and TTX. Road numbers to be announced. See-through etched-metal walkways and factory-applied plastic end handrails and end brake detailing. 70-ton trucks with 33" metal wheelsets. Metal knuckle couplers. Single well car with two containers, $67.95; two-car pack without containers, $99.95. Rapido Trains Inc., 905-474-3314, rapidotrains.com

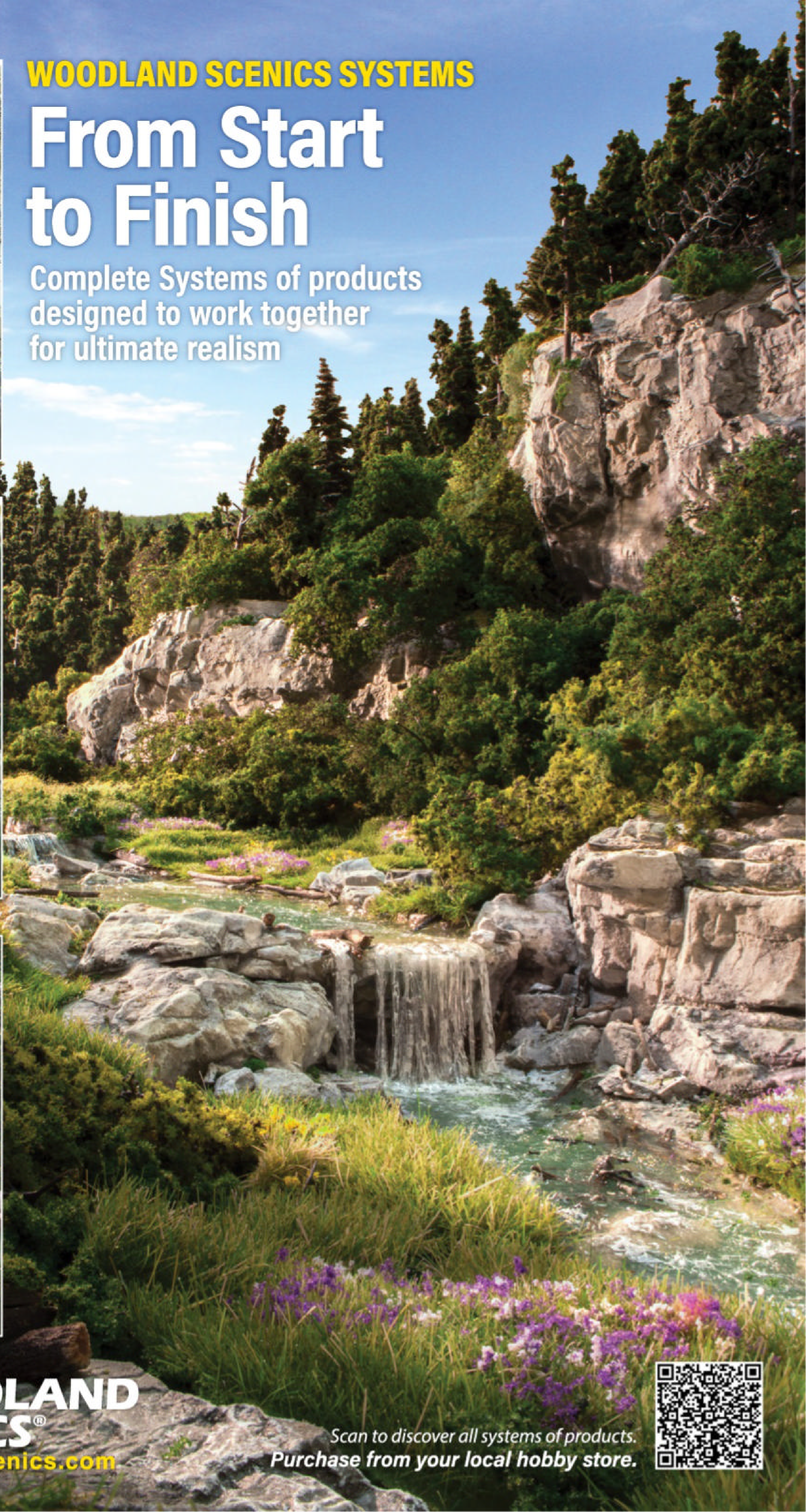
Hamm's BEER
H.A.M.X. 32015

- **North American Car Co. 8,000-gallon tank car.** Hamm's Beer; GATX; Penguin Ginger Ale; Vulcan Chemicals; and Wyandotte Chemicals. Three road numbers per scheme. Separate, factory-applied manway, vent, air reservoir, brake wheel, ladders, and bracing. Photo-etched metal platforms. Wireform end and platform railings. 100-ton roller bearing or solid-bearing trucks as appropriate with machined metal RP-25 contour wheels. Body-mounted operating AAR upper and lower shelf McHenry couplers. Minimum radius is 18". $44.99. Athearn Trains, 800-338-4639, athearn.com

HO scale passenger equipment



- ***City of San Francisco* series lightweight passenger cars.** New cars, road numbers, and paint schemes. Union Pacific: American Car & Foundry 85-foot observation dome lounge (restocks with *Challenger*, *City of St. Louis*, *City of Los Angeles*, and *City of Portland* tailsign, available standard or lighted), club-lounge, dome coach, dome diner, and dome lounge; 85-foot Pullman-Standard (PS) *Paclid*-series 11-double-bedroom sleeper and *Ocean*-series 5-bedroom, 2-compartment, 2-drawing-room sleeper. Milwaukee Road (Armour Yellow and Harbor Mist Gray): Budd *Pacific*-series 10-roomette, 6-double-bedroom sleeper. Pennsylvania RR (Armour Yellow and Harbor Mist Gray): 85-foot PS *Rapids*-series 10-6 sleeper. Southern Pacific: 85-foot PS *Imperial*-series 4-double-bedroom,



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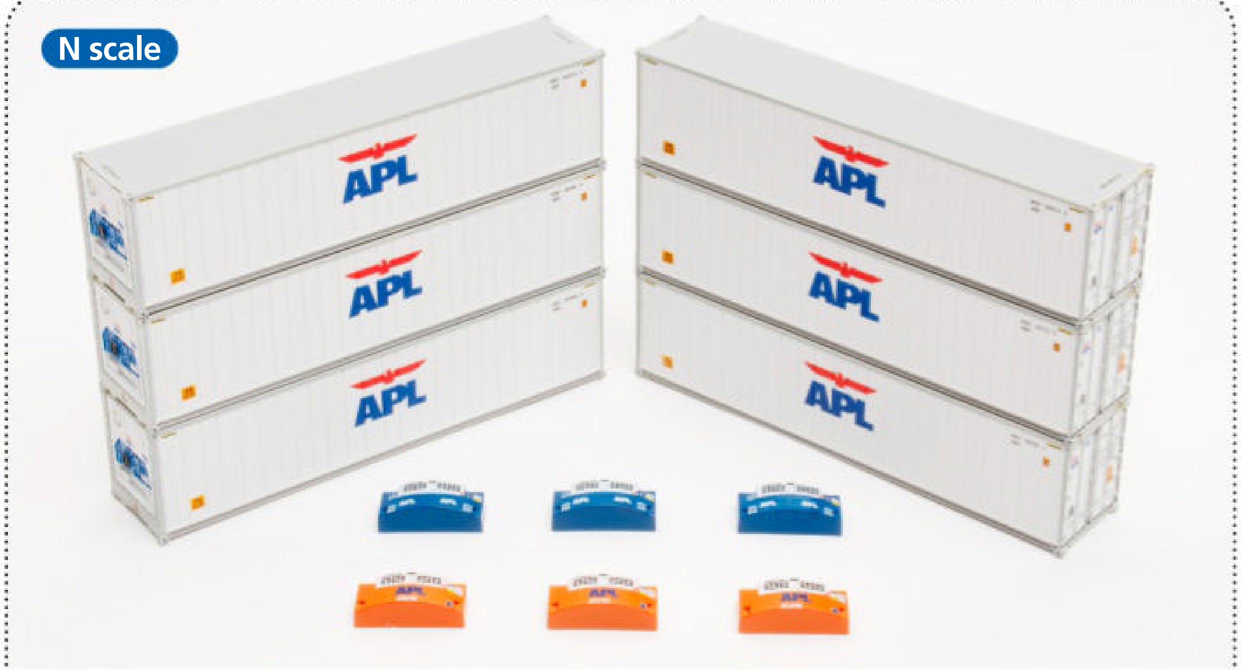
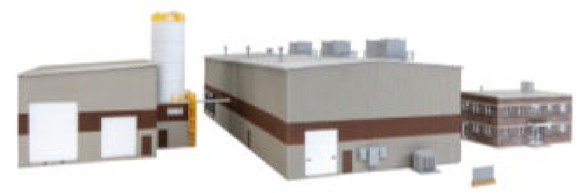


40-foot high cube reefer containers. This refrigerated containers six-pack is now available from Jacksonville Terminal decorated for American Presidential Lines Ltd. for $134.95. The containers have scheme-specific tooling including eight different refrigeration units, four door styles, five body side styles, and two variations of front gensets. Details include a separate, factory applied metal fan cover and new prototype bottom with exposed rib support beams. The genset units are magnetic and can be detached. Jacksonville Terminal Co., LLC., jtcmodeltrains.com

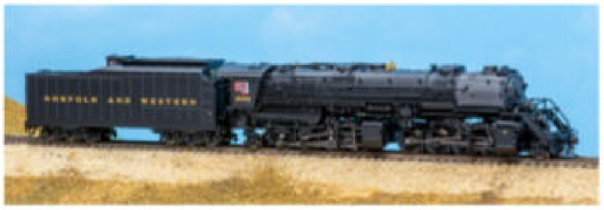
4-compartment, 2-drawing room sleeper, 83-C-2 coach (1950-1953 *Golden State* and post-1953 simulated stainless schemes), and 10-6 sleeper with blunt end (Armour Yellow and Harbor Mist Gray, *Cascade* two-tone gray, and 1950-1953 *Golden State*, and post-1953 simulated stainless schemes). Most cars offered in standard versions with water-slide car name and number decals or factory-printed car names and numbers. Fully assembled with interior and exterior details including factory-installed grab irons, prototype-specific window tinting and gaskets as appropriate. Modeler-installed extended drawbars for negotiating 22" radius curves included. 36" RP-25 metal wheelsets and Proto-Max metal couplers. $84.98 to $109.98. WalthersProto. Wm. K. Walthers Inc., 414-527-0770, walthers.com

HO scale structures



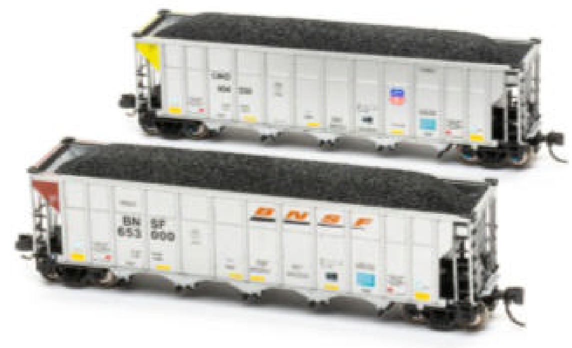
- **Chocolate factory.** Three buildings plus accessories including separate two-story brick office, large main building, and railcar and truck receiving building. Accessories include rooftop vents and large air conditioners, electrical equipment box and meters, truck docks with weather bellows, and roadside sign. Includes gravity-fed upright storage tanks, pipe bridge with piping, and unloading/loading rack for tank cars, hoppers, and semi trailers. Molded in four colors with clear acetate. $119.98. Walthers Cornerstone. Wm. K. Walthers Inc., 414-527-0770, walthers.com
- **Mounted communication antenna array.** For modeling modern communications equipment found on new and existing structures. Includes parts to build two rooftop mast-mounted arrays, four rooftop framed arrays, and 16 wall-mounted arrays. Kit includes parts for building tall or short antennas. Can be added to Cornerstone series and most other building kits (sold separately). $19.98. SceneMaster. Wm. K. Walthers Inc., 414-527-0770, walthers.com

N scale locomotives



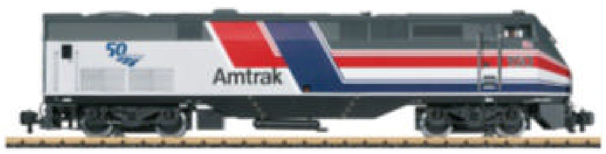
- **Norfolk & Western Y6b.** Norfolk & Western (black in five road numbers; blue fantasy scheme in one number; and maroon fantasy scheme in one number). Also available unlettered. Cast brass safety valves, boiler fittings, and generator detail and turned brass bell. Wire grab irons and boiler handrails; detailed crosshead and valve gear; and air tank, air pump, and piping details. Die-cast metal boiler shell and tender chassis with detailed injection-molded plastic body. Buckeye-style tender trucks with roller bearing journal details. Class 22I tender with rivet detail "doghouse." Light-emitting diode headlight and backup light. Dual-mode Paragon4 sound decoder with built-in capacitors. $599.99. Broadway Limited Imports, 386-673-8900, broadway-limited.com

N scale freight cars



- **AutoFlood III coal hopper.** Union Pacific (with CMO reporting marks), BNSF Ry., Carolina Power & Light Co., CIT Group, General American Marks Co., Gulf Power Co., and Western Resources Inc. Three numbered six-packs, one unnumbered six-pack, and at least one single car per scheme. Detailed end cages including air and brake piping. Factory-applied end crossover platforms and uncoupling levers. Full interior rivet and K-member details. Die-cast metal frame and floor. Removable coal load included. Single car, $38.95; six-pack, $233.70. Rapido Trains, 905-474-3314, rapidotrains.com

Large scale locomotives



- **General Electric P42DC Genesis.** Amtrak (phase 3 and phase 6). One road number per scheme. All wheelsets powered by two Bühler motor ball bearing motors. Multiple light and sound functions including cab and instrument lighting. Factory-installed American knuckle couplers. With mfx sound decoder, $1,400. LGB (Märklin Inc.), 573-635-1093, lgb.com

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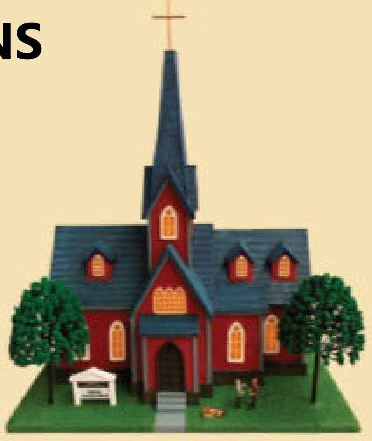

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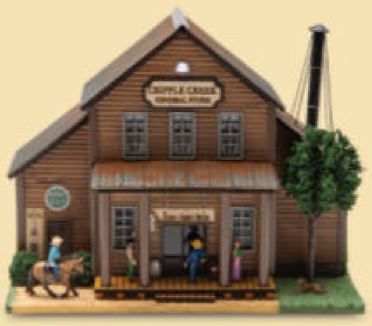

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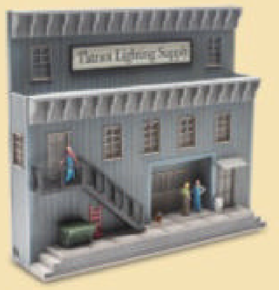

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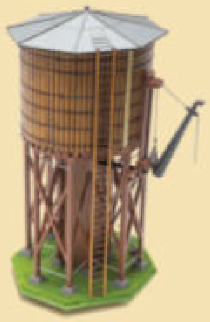

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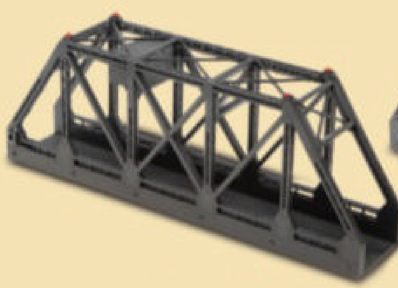

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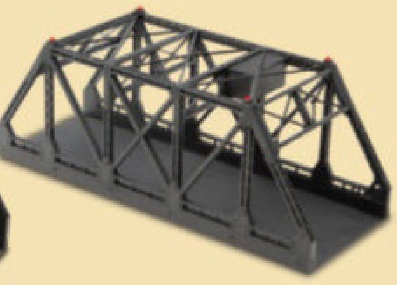

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Railway Post Office

Conducted by Steven Otte

In praise of the Bishop Street Branch

Lance Mindheim's Bishop Street Branch project layout (January-April) is gaining accolades from readers. Lance Mindheim photo

I read with interest the January 2023 issue of MR, particularly "Meet the Bishop Street Branch" by Lance Mindheim. The first thing that jumped off the pages was the attention to detail. The buildings and the scenery put an operator at the location. You can almost feel the surroundings.

The second thing that I learned is that an operator can experience meaningful operations without the layout being mammoth. Bigger is not better.

The last point well taken was the suggestion to visit the actual site the layout depicts if possible. Several members of the crew that built my layout visited the actual town, took photos, and measured buildings. The visit was a fantastic resource. Keep up the good work.

Mike Porter, Parkville, Mo.

More praise for Lance Mindheim

I'm really enjoying Lance Mindheim's Bishop Street Branch. Nothing personal, but MR's recent project layouts were getting stale. Lance brings a fresh perspective to your project layout series, and his articles go beyond Layout Building 101. This makes the series more interesting to veteran model railroaders like myself.

Joe Musgrove, North Little Rock, Ark.

And speaking of Lance...

I really enjoyed Tony Koester's most column "The Someday Central" (April). None of us are guaranteed a tomorrow. Time is a commodity that can never be recovered. If the piece motivates just one person to move from armchair to action, then it's served a valuable purpose.

Lance Mindheim, Silver Spring, Md.

And a counterpoint

I write in defense of "Someday Central" model railroading. Tony Koester's sarcastic column reached one subscriber friend two days after his wife died. The couple waged a multi-year battle against a terminal disease. Near the end, they downsized, giving up forever his unfinished layout space. His closet full of unbuilt kits could trigger eye rolls from some. But those untouched treasures should be seen as a testament. When personal pleasures beckoned, he considered and responded to family first.

My friend never had a fully operational layout. But he's a prize-winning modeler. And, he assures me, he still plans for his Someday Central.

Philip Padgett, Rockville, Md.

Eye spy... a mistake

The tool that Jeff Johnston described would be used by an optician, not an ophthalmologist ("Track Bending Pliers," April). Opticians are professionals who assemble and dispense eyeglasses. An ophthalmologist is a medical doctor who diagnoses and treats disorders of the eye.

Joseph Lechner, Mount Vernon, Ohio

Correction

The photo of SPMX covered hopper No. 7022 on page 15 of March's issue was shot in Altoona, Pa., not Hollidaysburg, Pa. MR

Comments, suggestions, and additional information on Model Railroader articles and departments are welcome in this column. Every comment will be read, but not all can be printed or answered. Make your statement in 300 words or less, and send it to **Railway Post Office, Model Railroader magazine, P.O. Box 1612, Waukesha, WI 53187,** or e-mail **editor@modelrailroader.com**. Please include your name, city, and state.

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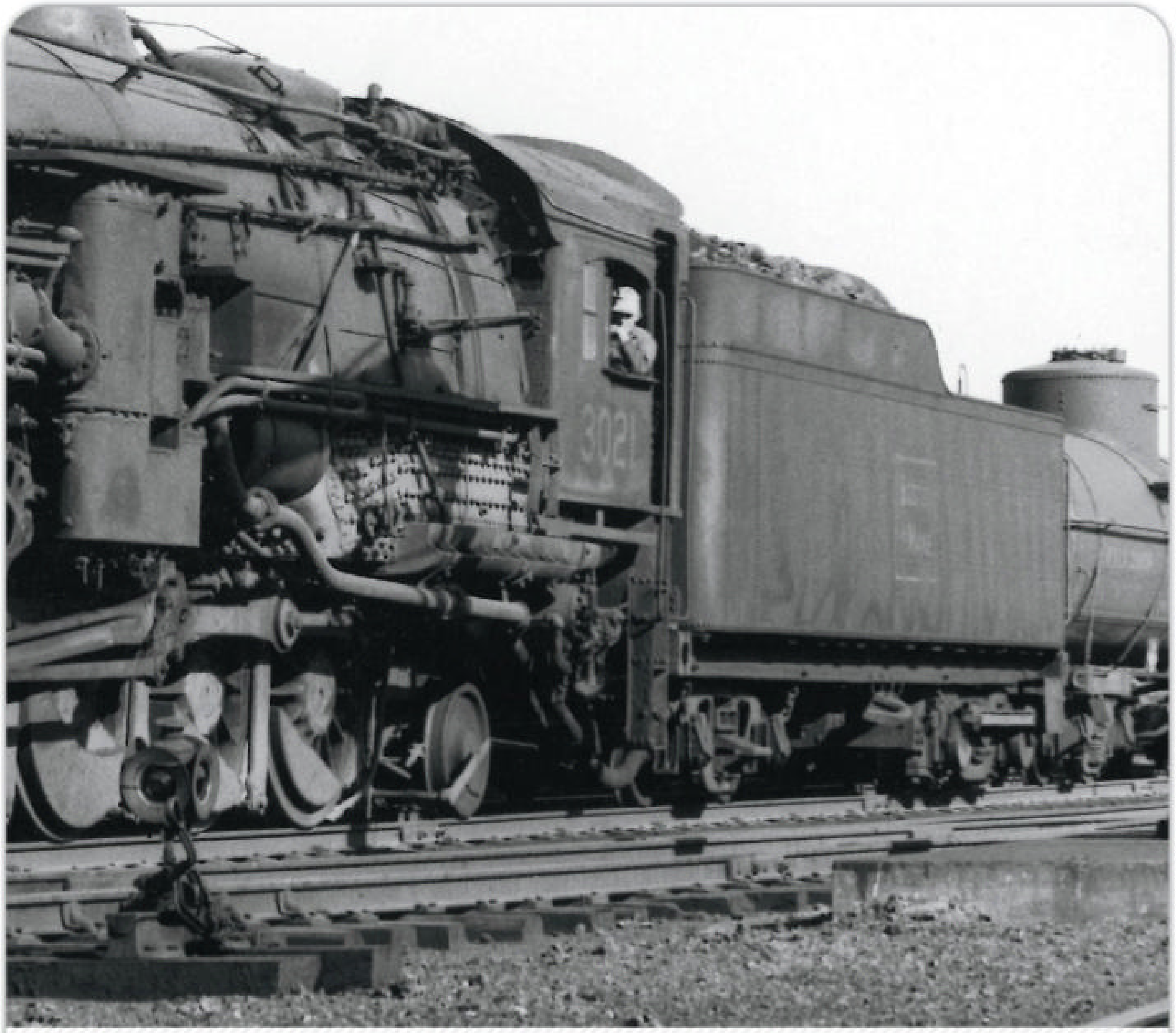


A Boston & Maine 2-10-2 steam locomotive is seen at Worcester, Mass., in an undated photo. The tender's rear truck looks a little different from its front one because it's a booster engine, an auxiliary locomotive designed to turn the main locomotive's excess steam at slow speeds into extra traction to help get the train started. H.F. Harvey photo

What's up with that strange tender truck?

Q I watch videos of model railroads on YouTube. On a video of a Boston & Maine layout, I saw a strange steamer. A 2-10-2 had a long tender, and on the rear truck of the tender, the wheels had counterweights and were ganged together with a connecting rod. Why?

Robert Beadle

A What you're seeing under that tender is a booster engine, which some manufacturers called an auxiliary locomotive. It's a small, two-cylinder steam engine, either under the tender or on the engine's trailing truck, that runs off steam from the main boiler. Its purpose is to help start and maintain slow speed on heavy trains.

A steam locomotive can be designed either to run well at high speed or produce a lot of traction at a lower speed, depending on the size of the drivers. Since the pistons and drive rods of a steam locomotive are directly connected to the drive wheels, there's no way for a steam locomotive to "change gears" like an automobile can to switch between speed and power. A high speed (generally, passenger) locomotive doesn't perform well when traction is needed. Also, a steam engine can't just turn down its fire when less steam is needed; instead, the excess steam is vented away. So at low speeds, the locomotive is wasting a lot of steam power.

Enter the booster engine, which turns that wasted steam into additional low-speed traction. Booster engines were on average rated at about 300 hp at a speed of 10-30 mph. The engineer would use the booster to get the train started, then cut out the booster when it got up to a speed that the main engine could handle more efficiently.

Q I want to run six-axle power and trains of 15 cars or so around a return loop without any tight curves to it. What would be the recommended curve radius I should use, and how much space do I need?

Mike Bailey

A The flippant answer is, how much space have you got? Modern diesel locomotives and the super-long freight cars they pull today will look more realistic on the broadest curves you can give them to operate on. Even if your HO scale DDA40X will handle a 21" radius, it will look pretty silly with the fuel tank overhanging the inside of the curve.

But seriously, the answer depends on what scale you're modeling in. You'll need a lot more space for a loop of track in O scale than you would in N. Since you didn't specify your preferred scale, I'll give you some guidelines for the most popular ones.

In his book *Track Planning for Realistic Operation*, John Armstrong recommends minimum curvatures of 11" for N scale, 18" for HO, 24" for S, and 35" for O scale. But since you want to run modern six-axle power, your minimum should be what Armstrong refers to as conventional curves, with broad curves (or even larger) being your goal.

	N	HO	S	O
Broad curves	17"	30"	41"	58"
Conventional	14"	24"	32"	46"
Sharp curves	11"	18"	24"	35"

So let's get back to your question: How much space for a loop of track using conventional or even broad curves? Again, I have to ask: How much space do you have? Because the bigger your layout, the broader curves you can have, and the better your long rolling stock will look and run.

If we're talking N scale (though I doubt we are), a turnback loop in conventional curves would be 28" across, which would fit comfortably on a 3-foot-wide table. An N scale broad curve would take up 34", which would be fine in a skosh over 3 feet. An HO scale conventional curve would be 4 feet across, a bit too large for the traditional 4 x 8 starter layout. At 60" across, a broad HO scale curve would require too long of a reach-in distance for a solid table; at this size or bigger, you'd have to think about

The broader your layout's curves are, the better your large rolling stock – like this HO EMD SD90MAC-H and its train of auto racks – will look and run. Steven Otte photo

a space for access in the middle of the layout. In S or O scale, you're definitely going to need to access your layout from the middle, rather than the edges.

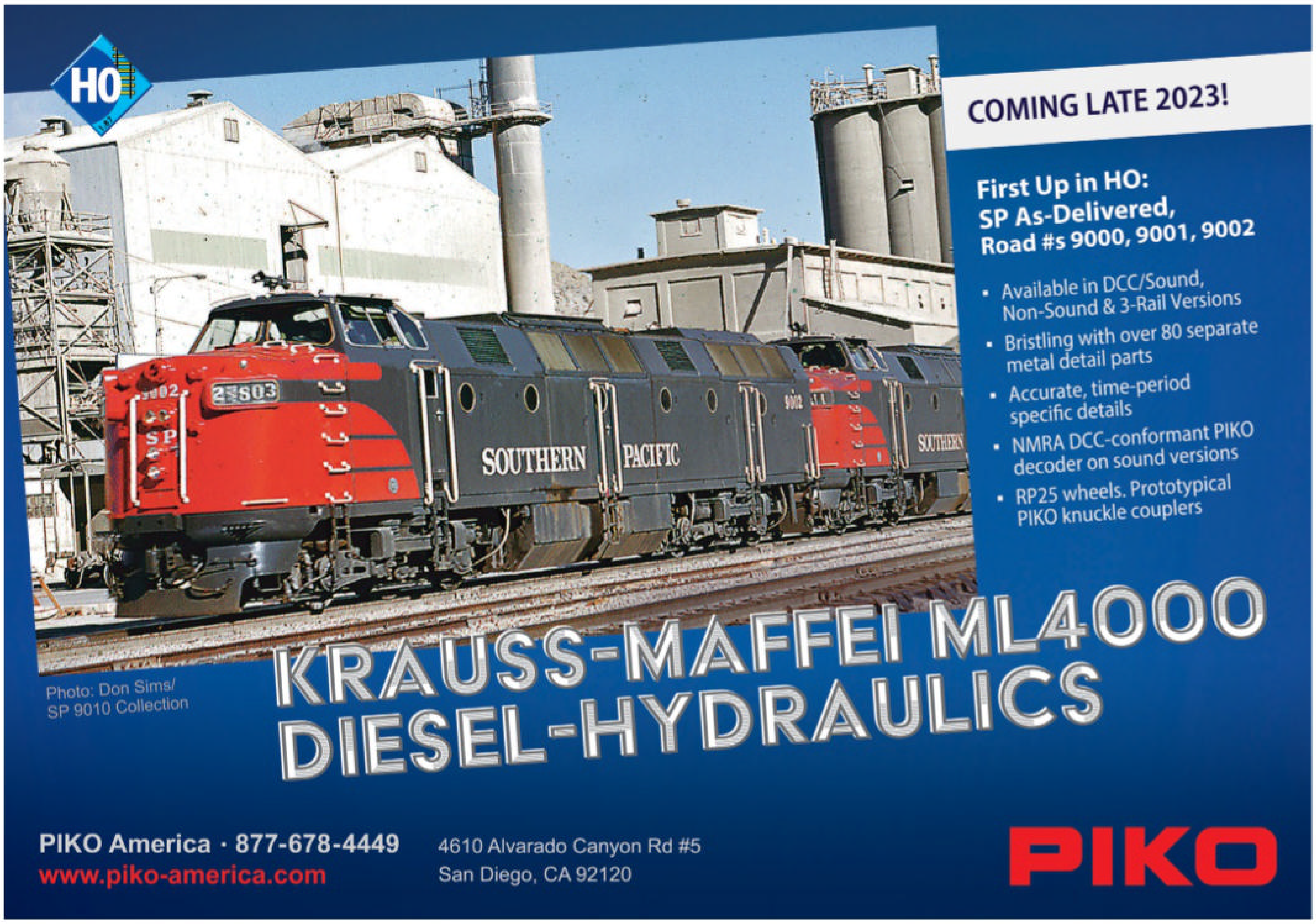
And that brings me to the reason I keep asking about your space. Beginning modelers often conceive their first layouts as occupying the center of the room, with walking space all around it. But an "island" configuration like that is about the most inefficient use of space. A 4 x 8 layout with 3 feet of aisle space on all four sides puts 32 square feet of layout in a 140-square-foot room. Switch to an around-the-walls design with 2-foot-wide shelves around the perimeter, and the same 10 x 14-foot room yields 80 square feet of layout. Which means a longer main line, more space for towns and scenery, and a more prototypical run between stops. It gives you a better looking layout, too, with backdrops behind your trains instead of having to look over at Bob and Chuck running their trains from the other aisle. And while a 4 x 8 layout can handle at most 21" curves, you could easily put 30" or even broader ones into the corners of that around-the-walls layout.

So if it's broad curves you want, start thinking outside the box.

Q Interesting article on removing the flanges from steam locomotive drivers ("Is removing the flanges from locomotive drivers a good idea?," May 2022, Trains.com). So, what about those long diesel engines like the General Electric C44-9W or EMD's FP45s or SD40? Could removing flanges from diesel wheels help my HO scale Athearn Blue Box diesels go around 19" radius curves? If so, the question becomes what's the easiest way to remove those flanges without a lot of time and effort?

Jim Myrhum

A I still wouldn't recommend it. In fact, I'd recommend removing flanges from diesel wheels even less than I would from steam locomotive drivers, and for the same reason: If your locomotives



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Diesel locomotive wheels, even those on a long wheelbase engine like this HO scale General Electric Dash 9-40C model from ScaleTrains.com, are mounted differently and move differently than steam locomotive drivers. As such, removing flanges from diesel wheels isn't necessary. *Model Railroader* staff photo

won't go around a tight radius curve, it's not because of the wheel flanges.

You might have a case if you were talking about a 2-10-0 Decapod or 4-10-0 Mastodon steam engine. Many models of those locomotives come with flangeless, or "blind," middle drivers, just as the prototype did. But even the longest diesel trucks, like those on a GE Dash 9, don't approach the wheelbase of those steam engines. Even the wheelbase of the four-axle trucks of an Electro-Motive Division DDA40X is only 17'-1½", not much longer than the drivers on a USRA Mikado.

It's true that our models have to handle proportionally much tighter curves and sharper turnouts than their prototypes do. But they're made to handle it. The center axle of a three-axle diesel truck (and sometimes other axles) are designed to have some side-to-side play in their bearings. This lets all the wheels stay on the rail on even the tightest curves. What's more, unlike on a steam locomotive, the trucks themselves are mounted near the ends of a diesel's frame, and can pivot.

What limits how tight of a curve a diesel can handle is how much those trucks can pivot. Since, as I said, model curves are proportionally much sharper than those on the prototype, the trucks on prototype diesels don't have to pivot as much as those on our models. On our models, underframe details like fuel tanks, air tanks, end steps, battery boxes, draft gear, and more can get in the way of that wider swing. Model designers therefore often have to choose between fidelity to detail size, shape, and placement vs. making their trucks able to pivot enough to take 18" curves.

The mechanical linkages between model trucks' gear towers and their frame-mounted motors and drive shafts also can limit how much a diesel locomotive's trucks can pivot. That's usually the limiting factor on the track curvature a diesel can handle. Ultimately, removing flanges from a diesel's wheels won't improve that.

Q I'm building a new layout using Kato HO scale Unitrack. I have read many different opinions on whether to solder all track joints. What's the best practice? I use terminal joiners every 3 feet and wonder if I should at least solder those to the rails.

I haven't seen much about planning for track expansion and contraction. Since Unitrack sections snap together, allowing no gap between rails, I wonder if it would be wise to cut 1/16" gaps in the rails every so often, using my rotary motor tool with a thin circular blade. How often should these gaps be cut? And how do turnouts come into play?

Tom Helm

A It's quick and convenient to use terminal joiners on Kato Unitrack, especially for temporary layouts that are set up on a tabletop and cleared away later. But if your track is permanently attached to a layout, there's no reason not to solder feeders directly to the rails. Rail joiners are made of nickel silver, which is not as good of a conductor as copper wire. They can also become loose over time, leading to electrically dead track sections. A better practice is to solder your rail joints (except for insulated joints between wiring districts, of course), and solder track feeders from your bus to the rail every 3 to 6 feet.

It is generally considered a good idea to cut occasional gaps in your rails to allow for benchwork contraction (which many modelers wrongly attribute to thermal rail expansion). However, sectional track with attached plastic roadbed like Kato Unitrack is less susceptible to this than track that's attached directly to the roadbed or subroadbed. Plastic roadbed doesn't shrink over time and insulates the track from the shifting of wooden benchwork. So gapping the track is not as important for you.

Again, the exception is for separating wiring districts. Turnouts must be fed power from their point ends, or else short circuits can be created, so rail gaps and/or insulating rail joiners are needed at the frog end.

Another concern is that a rotary motor tool with a cutting disk tends to cut gaps that are wider than desirable. If you must cut rail gaps in sectional track, use a razor saw and be careful to keep the blade steady so the gap is no wider than it needs to be. **MR**

Send questions to senior associate editor Steven Otte at AskTrains@Trains.com.

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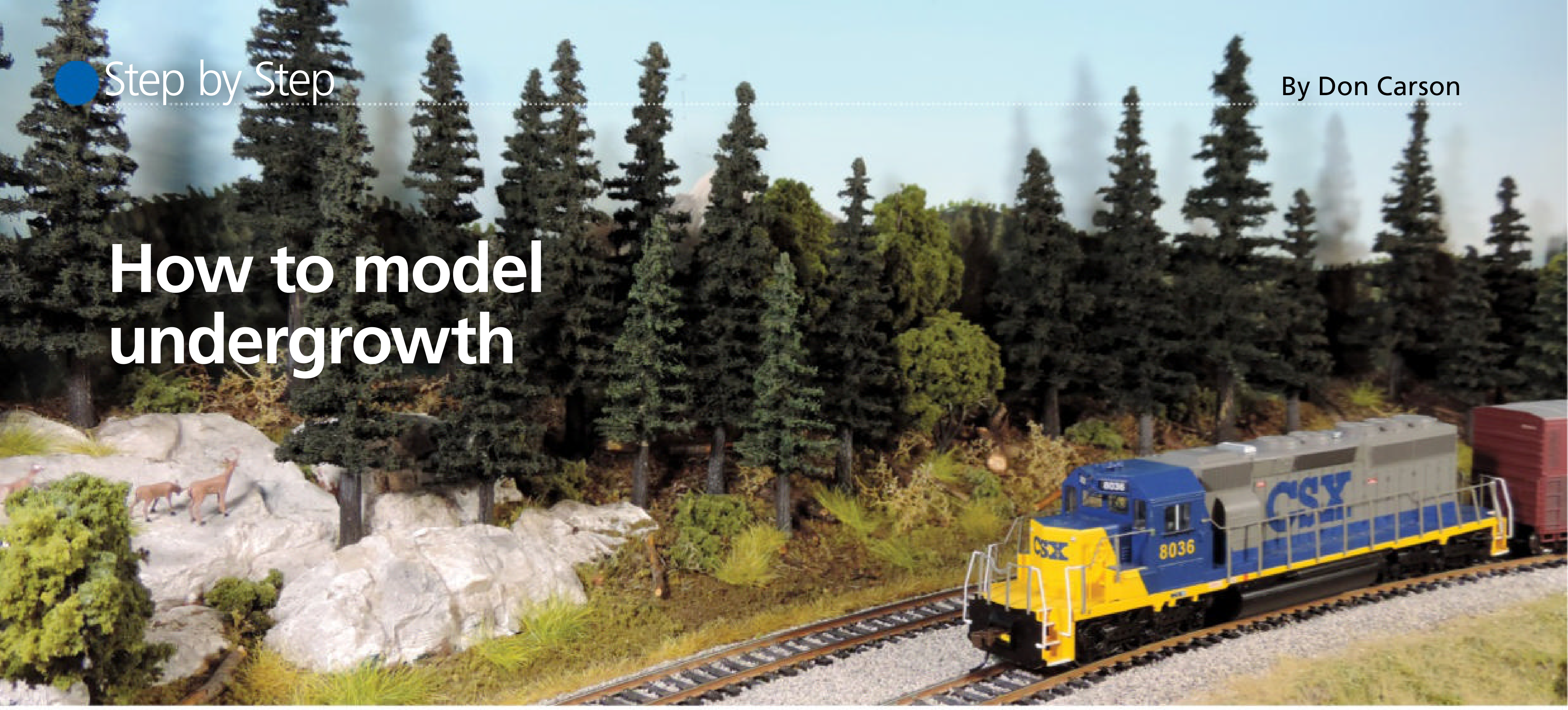
By Don Carson

How to model undergrowth



CSX Electro-Motive Division SD40-2 No. 8036 leads a freight past a wooded scene on Don Carson's HO scale layout. In this month's Step by Step, he shares how to add undergrowth to forested areas. Photos by the author

I started my current layout around 15 years ago. Since I live in the middle of the Willamette National Forest in west central Oregon, I focused my early scenery efforts on modeling pine and deciduous trees. When I planted the finished trees on my model railroad, something didn't look right. Then it dawned on me. My small forest lacked undergrowth. Even though I knew what was missing, I struggled how to remedy the situation.

I have a bad habit of not finishing something and moving on to new projects. During the next several years, I worked on other sections of the layout. I stayed away from major tree planting projects until I could figure out the best method to model undergrowth.

Then I came down with a severe medical condition. The recovery period kept me from driving long distances. I used a senior ride service to get to doctor appointments. This put me on the other side of the vehicle, which gave me time to observe the surroundings in much more detail.

During the trips, I noticed things that had escaped me before. Most of the forest floor was covered with shrubs, broken tree limbs, grass, and lots of leaves. There were even leaves under the fir tress – not because they had fallen from the tree above, but because they had been blown around the forest floor.

Each trip to the city gave me additional input. This gave me the courage to model what I'd seen using a mix of off-the-shelf scenery products and natural materials from my yard.

If you're fortunate enough to live near a forest, grab your camera and take a hike in the woods. When you return home, study the photos and figure out what you can use to replicate what you see in the images.

Don Carson lives in Oakridge, Ore. This is his first Model Railroader *byline.*

STEP 1 WHAT YOU'LL NEED

I tested my scenery methods on 1"-thick extruded-foam insulation board panels. You can either leave the foam flat or shape it with flexible sanding sponges or a rasp. I painted the foam with flat interior latex house paint before proceeding ①.

The products I used for undergrowth are shown in ②. Off-the-shelf items include Woodland Scenics Static Grass Flock, fine turf, coarse turf, Clump-Foliage, and Fine-Leaf Foliage. I supplemented the commercial items with twigs gathered in my yard, assorted colors of dyed sawdust, and real rocks.

To give the forest floor more color and texture, I ground up dried leaves in a blender. Don't use your good blender for this. Buy a used one instead.

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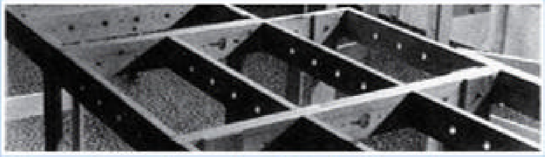

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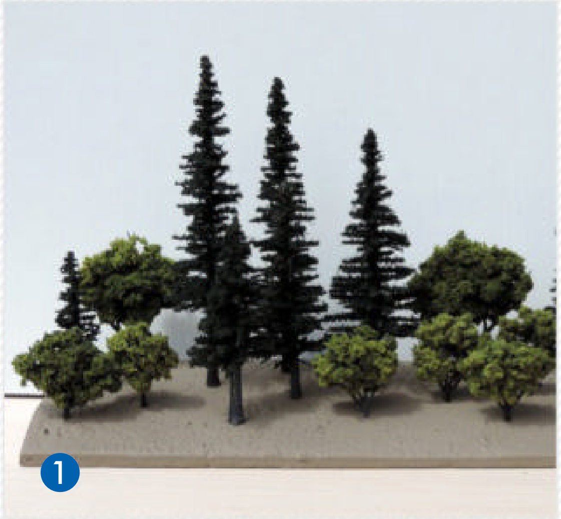
STEP 2 MAPPING THINGS OUT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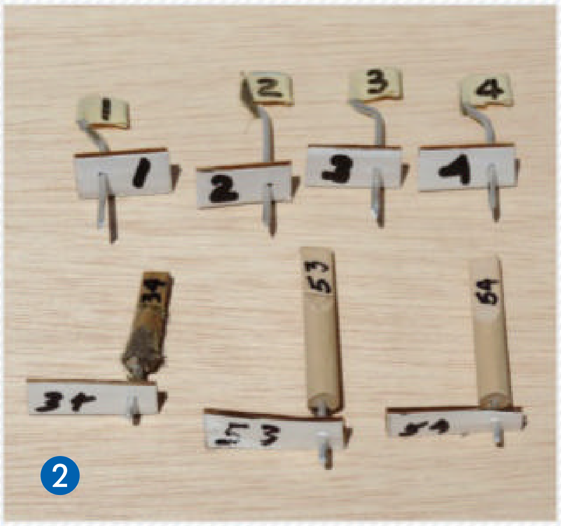
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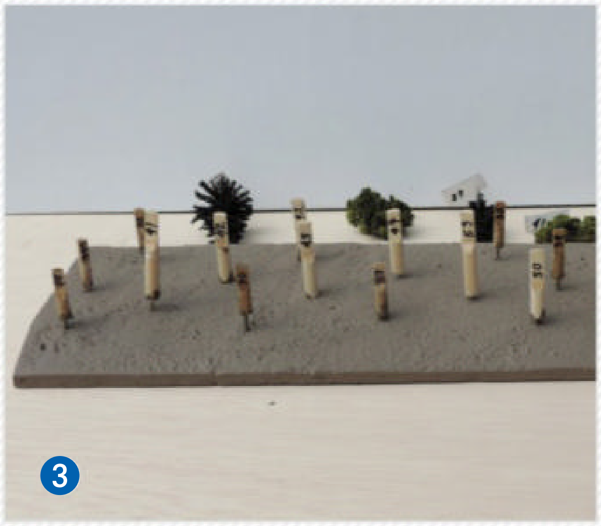

③

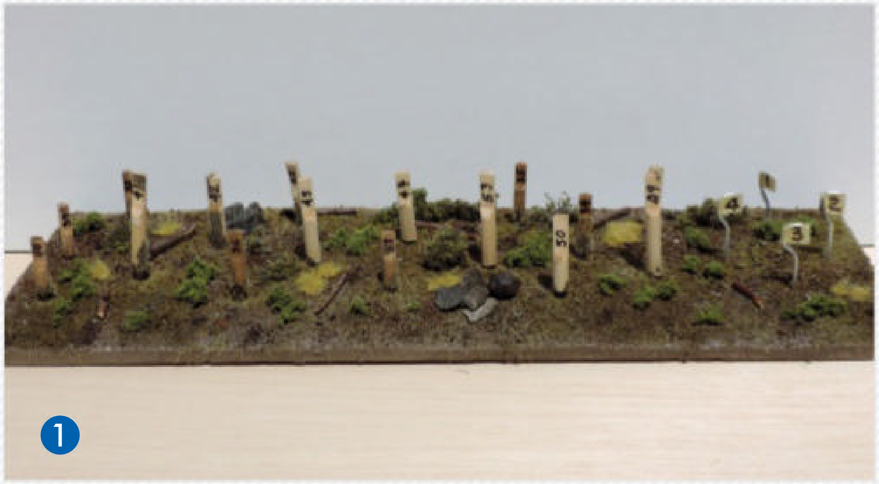
Before scenicking the foam panel, I temporarily stuck the trees into the foam ①. This gave the me the opportunity to test different tree placements until I was satisfied with the look. I tried to re-create things I saw in prototype photos and during trips to medical appointments. Notice how I put the pine and deciduous trees into small, often odd-numbered groups.

Trying to find all of those holes after the scenery is added would be difficult at best. I tested a couple of solutions to mark the holes. First, I made markers using 3⁄8"-diameter dowel rod and 3⁄32" soft aluminum welding rod. You can find the rod at welding supply shops, some big box retailers, and through various online retailers.

Though effective, the markers were time-consuming to build. Later I decided to skip the dowel and just use the welding rod. I numbered each dowel and rod and attached a piece of cardboard with a corresponding number to the bottom of each marker ②.

Then I removed all of the trees from the foam base and placed marker pins in the holes ③. I attached the numbered cardboard squares to the planting pin on the bottom of each tree.

STEP 3 ADDING THE UNDERGROWTH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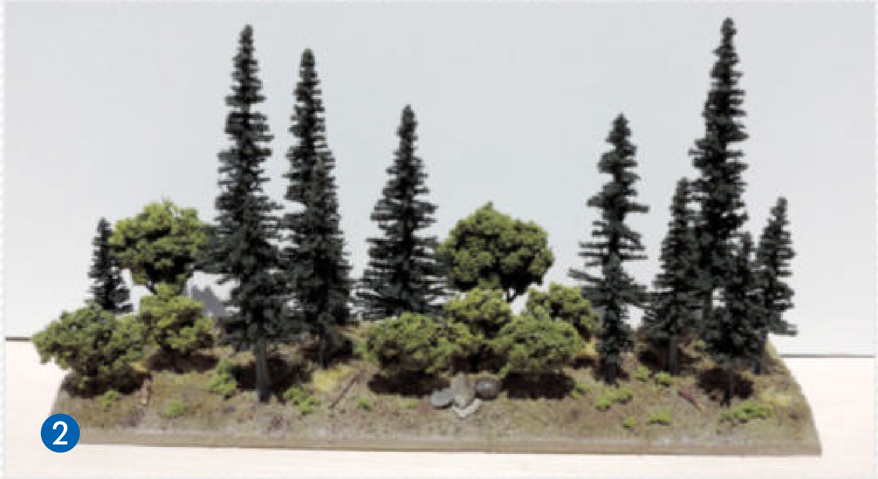
②

Before applying the scenery materials, I brushed flat latex house paint onto the foam, working in one-square-foot sections. With the paint still wet, I applied the base ground cover. I used white glue to secure the rocks, branches, lichen, and Clump-Foliage ①.

You may have noticed the static grass tufts in the top photo on the previous page. Though they're available from several manufacturers, I made my own. First, I dribbled a small amount of white glue on a non-stick surface.

Then, using a static grass applicator, I applied a generous amount of flocking material to the still-wet glue. I turned the pan upside down and tapped it a little to knock off the excess fibers. I reclaimed the loose material for future use.

Once I was satisfied with how the forest floor looked, I used Woodland Scenics Scenic Cement to secure the scenery material.

Finally, I pulled out each marker and inserted the trees into their corresponding holes ②. If a tree doesn't want to stay upright, add full-strength white glue to the trunk and mounting pin and use a clothespin to keep it in position until the glue dries. On angled surfaces, you may need to file or grind the trunk to match the terrain.

With that, you can either blend the foam section into your model railroad, or you can commit the techniques you tested on the foam to your layout. Regardless of the path you take, you'll be rewarded with a wooded scene with realistic undergrowth.

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By Jordan Koester

A tribute to Tony Koester

Jordan Koester, left, is seen with his grandfather, *Model Railroader* contributing editor Tony Koester, during a 2017 vacation to Nantucket, Mass. The younger Koester credits his grandfather for instilling in him a love of model railroading. Sara Koester photo

I consider model railroading to be a close-knit community with a large support system. Every hobbyist can point to a person who inspired them – a parent, grandparent, aunt, uncle, or just a friend. Inspiration can come in many forms, and from all walks of life.

Luckily for me, my grandfather is an extremely passionate and avid modeler who has inspired me throughout my 26 years of life in this hobby and out. That man, Tony Koester, is well known to the hobby community for his "Trains of Thought" column in *Model Railroader* as well as the countless books he has written over the years. He's known to selflessly pour his experiences and immense knowledge onto the page every month to inspire and help grow the hobby from his perspective.

Oftentimes when I read his monthly column, I think "Huh, I didn't know that," even though I thought I'd heard all the stories.

I've always been taught there is no one right way to model. Whether you want to have an intricate, prototypical layout or just put some Lionel tracks on the living room floor, go for it! It's all for fun and enjoyment of the hobby. That mindset resonates deeply with me, and I think many of you can relate.

My father and his siblings grew up waist deep in model trains, as you could guess, but the love of the hobby skipped a generation and landed with me. Tony always had a basement layout for as long as I've been around. First was the Allegheny Midland, which occupied him for many years. Once it was done, he tore it down and was ready to move on to the next adventure, which was based more closely on the Nickel Plate Road. This prototype was very sentimental to him, as it was his hometown road as a child, which got him into trains. I was lucky enough to be a part of the new Nickel Plate layout from the beginning and was able to help him build it.

I live outside of Boston, while Tony lives in northern New Jersey. When I was growing up, we would make the trip a couple times a year. Sadly, this trip happens less frequently as I get older and life gets in the way.

Each time I visit, it's always a new learning experience. The layout is always further along each visit, but there's always a list of things to work on.

My visits weren't all spent down in the layout, though. We took many rides around his area, during which I learned the history of the local lines around his home. Many more hours have been spent in the office, learning how to create train schedules and waybills and edit photos for columns and books.

Seeing the relationships Tony has made with people who all respect and love him as a person only makes me more grateful and honored to call him my grandfather. These are people you can always count on. One such person is Perry Squier, Tony's close friend and neighbor. Perry has always been there for Tony's family and shares his love of the hobby.

My grandfather has always had an open phone line for any issue, not just for modeling but for everyday life, and I can always count on him for being there for me. Please cherish the people in your lives, in and out of the hobby, and thank them for what they gave to you in their lives. You never know when you won't be able to again.

My grandfather Tony is known to thank and show appreciation to many people in the articles he writes, but he deserves to hear the love for himself for once. Thank you, Tony, for being an inspiration to me in model railroading. Thank you for being a loyal and kind person to myself and everyone you come across in life. I love you more than you know! MR

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20494 Amtrak AMD 103 "Genesis" Diesel Locomotive; Road No. 108

Paint scheme and lettering are prototypical for Era VI. This is a special version of road number 108 for the 50th anniversary of Amtrak.

20493 Amtrak AMD 103 "Genesis" Diesel Locomotive; Road No. 160

Paint scheme and lettering are an adaptation of the Phase III scheme as applied to Amtrak's Dash 8-32BWH locomotives to celebrate the 50th anniversary of Amtrak.

LGB Amtrak cars have interior lighting and metal wheelsets. Passenger cars also have interior details. Cars include stickers for creating different road numbers when adding additional passenger cars to create a prototypical Amtrak passenger train.

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THE SEABOARD CENTRAL

SEABOARD CENTRAL
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Operations and motive power take precedence on this HO scale layout

By Tim Garland • Photos by the author

The Seaboard Central is a modern HO scale regional railroad set in the southeastern United States between Birmingham, Ala., and Savannah, Ga. during the spring of 2015. The following is the story of my lifelong dream and passion of creating my own railroad in miniature. This is the story of the Seaboard Central RR.

3016
3016
3016
NS 468041

① Seaboard Central locomotives No's. 3016 and 3015, both Electro-Motive Division SD40-2s, patiently wait in Griffin Yard to begin their daily operations. The scene takes place on Tim Garland's 11'-9" x 22'-9" HO scale model railroad.

An early start

Like many hobbyists, I started collecting model trains, along with anything else train related, at an early age. Initially, I had planned on modeling the Clinchfield RR after being fascinated by this unique coal hauling line located in the Appalachian Mountains. However, what I didn't realize was what I liked most about it was its size. The Clinchfield was similar in size to the Denver & Rio Grande Western or the Florida East Coast (FEC), two railroads that were also some of my favorites. They weren't large compared to the other Class I railroads, but still employed modern horsepower like their larger counterparts.

Then during the mid-1980s, *Model Railroader* magazine started publishing articles by Eric Brooman about his Utah Belt (UB). Like Allen McClelland's Virginian & Ohio, the Utah Belt had the same charm as the Clinchfield and the Rio Grande, but was one of the most realistic freelanced model railroads I'd ever seen.

I was completely captivated by the Utah Belt, and before I knew it, the seed for creating the Seaboard Central had been firmly planted. So I went on trying to find out as much as I could about Eric Brooman's creation by accumulating every article that had been written about his amazing model railroad. Now, instead of the Clinchfield, my new dream was to have a freelanced model railroad similar to the UB.

From this point, I started looking for a logical place for my railroad to exist. My thought was that in order for it to be conceivable, it would need to operate over existing secondary trackage that a Class I railroad would most likely sell or lease. It didn't take long before I started to formulate a plan by connecting lightly used trackage formerly owned by the Seaboard Coast Line (SCL) with others from the Central of Georgia (CG).

Then in December 1985 and January 1986, *Model Railroader* published a couple of articles on a project layout called the Seaboard Central. A light went on in my head. Here was the perfect name for my railroad! A railroad that existed by utilizing former SCL and CG tracks. Thus, the Seaboard Central was born.

The concept

The Seaboard Central, for all intents and purposes, is considered a modern-day regional railroad similar in size to the FEC. It links Birmingham, Ala., to Savannah, Ga., and the ports, with a few branch lines in between. The SC's history begins by taking over operation of the Cedartown Branch from the CSX on January 1, 1990, as a Class III shortline railroad. The Cedartown Branch runs between its namesake and Cartersville, Ga., and began operations with a former Conrail GP38 and an ex-Seaboard System GP16. Both units were painted in

② Norfolk Southern C44-9W No. 9692 leads one of the trackage rights trains across the layout. This is a run-through train and will not work any industries or yards on the layout.

③ Seaboard Central train SC 442 departs Griffin Yard after setting out and picking up cars. It will continue to Macon, Ga.

scarlet and dark gray with yellow Seaboard Central lettering on their sides.

In 2000, the SC took over trackage from Cedartown to Senoia, Ga., under a lease agreement with Norfolk Southern (NS). Later in 2004, the SC managed to acquire the trackage from Cedartown, Ga., to Birmingham, Ala., from CSX. This included a branch from Wellington to Guntersville, Ala.

In 2004 the SC changed its paint scheme from scarlet and gray to dark blue with white lettering, first showing up on three former Southern Pacific SD40T-2s.

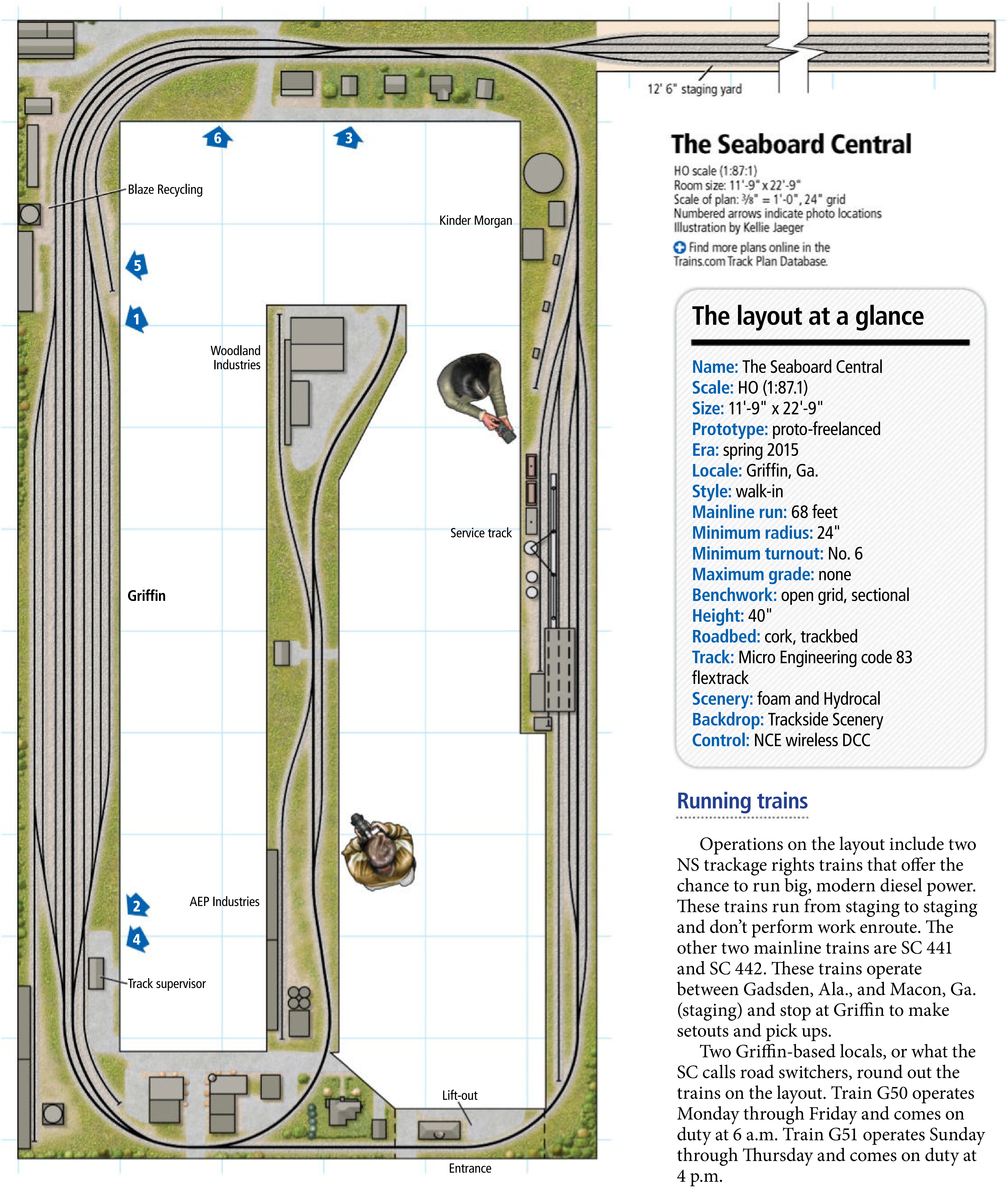
Through the years, the railroad continued to grow, acquiring the former CG Forest Park to Macon, Ga., line from NS in 2008 and also by rebuilding sections of abandoned track in order to connect the properties. By 2012, after the acquisition of the Georgia Central's former SCL main between Macon and Savannah, Ga., the Seaboard Central had grown to a Class II carrier and had amassed a moderately sized fleet of second-generation EMDs consisting of mostly GP38-2, GP40-2 and SD40-2 units. Many of the diesels retain their original owner's paint schemes and were simply patched over to get them into service quicker.

Track plan

When it comes to operating our layouts, model railroaders often fall into two different categories: Those who enjoy the railfan perspective and those who enjoy switching and operations. I personally enjoy both. However, I enjoy switching the most when it comes to operations. I especially enjoy yard switching and can spend hours sorting out cars in my yard. For me, I'll take the yard job over everything else.

The current version of the Seaboard Central is an around-the-walls sectional layout with a center peninsula located in a 11'-9" x 22'-9" room in my basement. A 12'-9" long four-track staging yard resides in an adjoining room representing both Gadsden, Ala., and Macon, Ga.

Originally, I had planned on building a double-deck layout similar to Pelle Søeborg's Daneville & Donner River. I built the lower level 40" off the floor. My



The Seaboard Central

HO scale (1:87.1)
Room size: 11'-9" x 22'-9"
Scale of plan: 3/8" = 1'-0", 24" grid
Numbered arrows indicate photo locations
Illustration by Kellie Jaeger

⊕ Find more plans online in the Trains.com Track Plan Database.

The layout at a glance

Name: The Seaboard Central
Scale: HO (1:87.1)
Size: 11'-9" x 22'-9"
Prototype: proto-freelanced
Era: spring 2015
Locale: Griffin, Ga.
Style: walk-in
Mainline run: 68 feet
Minimum radius: 24"
Minimum turnout: No. 6
Maximum grade: none
Benchwork: open grid, sectional
Height: 40"
Roadbed: cork, trackbed
Track: Micro Engineering code 83 flextrack
Scenery: foam and Hydrocal
Backdrop: Trackside Scenery
Control: NCE wireless DCC

intention was to practice all my techniques on the lower level, then take use my newly gained skills to finish the upper level. However, after enjoying the current level of operations with the lower level, I realized that the upper level wasn't necessary.

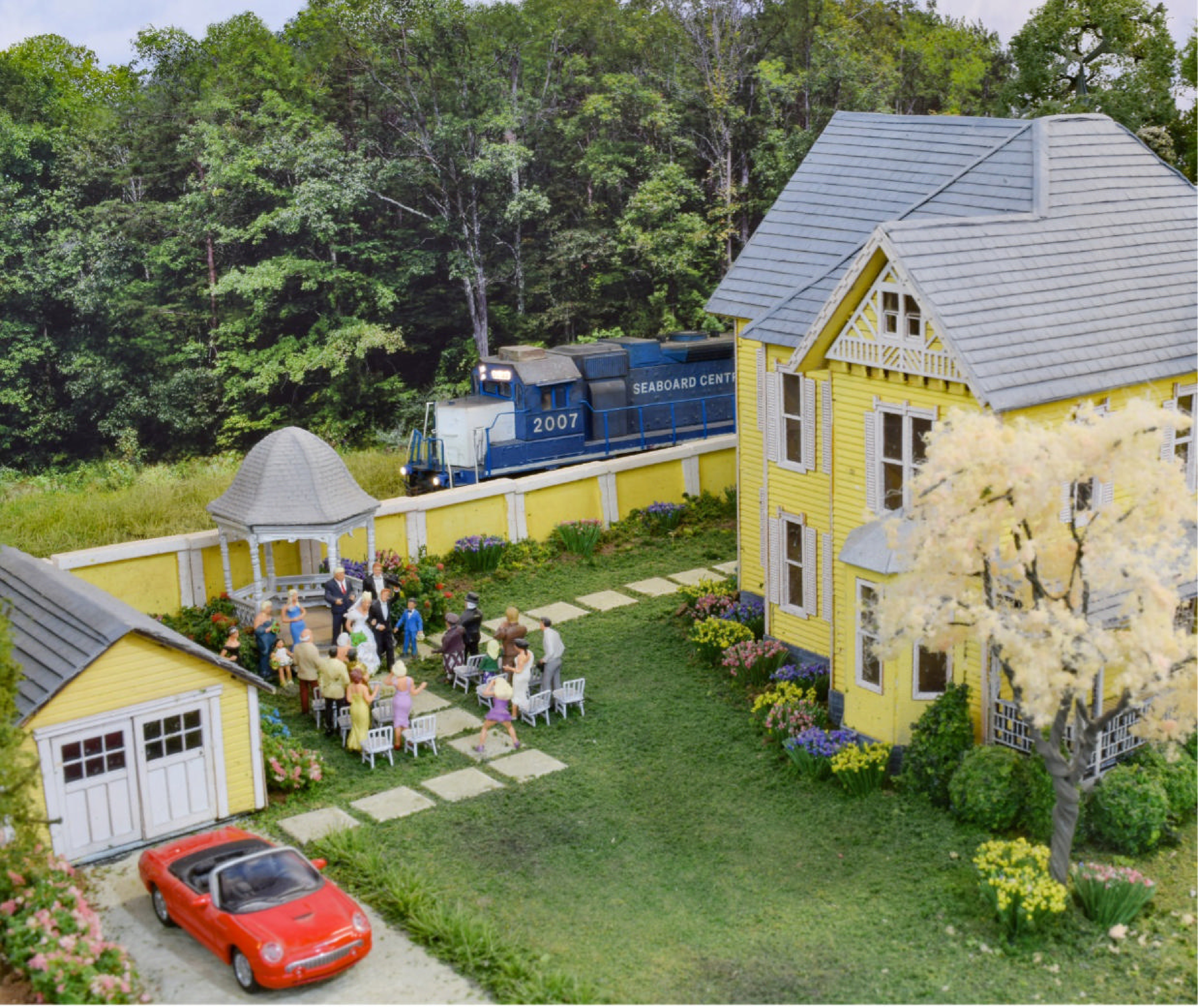
By early 2019, I'd removed all the upper-level brackets and installed new backdrops. The layout includes a locomotive servicing area and car shop on one wall and a moderate-sized yard on another. A few small industries are also located here and there.

Running trains

Operations on the layout include two NS trackage rights trains that offer the chance to run big, modern diesel power. These trains run from staging to staging and don't perform work enroute. The other two mainline trains are SC 441 and SC 442. These trains operate between Gadsden, Ala., and Macon, Ga. (staging) and stop at Griffin to make setouts and pick ups.

Two Griffin-based locals, or what the SC calls road switchers, round out the trains on the layout. Train G50 operates Monday through Friday and comes on duty at 6 a.m. Train G51 operates Sunday through Thursday and comes on duty at 4 p.m.

Since traffic over the railroad isn't heavy, it's not signaled, but instead operates under Track Warrant Control (TWC). I always intended for the SC to be a laid back and slow-paced railroad. It offers just enough of a challenge to keep things interesting but doesn't have the high pressure of a signaled Centralized



④ A backyard wedding is interrupted by Seaboard Central train G51, one of the two Griffin-based locals. The SC's diesel fleet is made up of second-generation EMD units.

Traffic Control (CTC) system where things can seem rushed.

Due to speed restrictions and Federal Railroad Administration designated status, maximum speed on the mainline is 25 mph and all other trackage is limited to 10 mph. Curves and grades often restrict trains to 15 mph. Slowing the movements down not only lengthens the otherwise short run, but also makes the models look more realistic operating around tight curves.

A model railroad can have incredible scenery and outstanding models; however, the realism can be completely destroyed by operating the models too fast in the curves or slamming into the cars, making hard couplings. As a professional, when I see unrealistic operations such as that on a model railroad, it makes me cringe!

Locomotive roster

A couple of things were important when developing the SC locomotive roster. First, the roster had to reflect current practices of other Class II regional carriers during the time period being modeled. Second, as a professional locomotive engineer, they had to meet my approval. In my book, not all locomotives are created equal, especially after you run them for a living. The SC prefers second-generation EMD locomotives, not only for their reliability and performance, but also the ample number of parts that are readily available. This includes models such as SW1500, MP15, GP15-1, GP38, GP38-2, GP40-2, SD40-2, and SD40T-2.

The latest locomotives to arrive on property in first and second quarter of 2015 were five EMD SD32ECO units assembled by Juniata Locomotive Works and four ES44T4 units built by General Electric at its Fort Worth, Texas, facility. These nine locomotives are the first to wear the new dark blue and black scheme, a nod to the SCL and CG. With their arrival, this enabled the SC to return six EMD GP40X diesels, two cabless GP60Bs, and four SD50s off-lease.

The models in my fleet are from Athearn, Atlas, InterMountain, Kato, MTH, and ScaleTrains. All locomotives are equipped with ESU LokSound decoders, capacitors, and light-emitting-diode lighting.

SEABOARD CENTRAL
SEABOARD CENTRAL
2008

⑤ It's a busy morning by the Griffin Yard office. A Norfolk Southern crew is staging to inspect the Seaboard Central's mainline as per their trackage rights agreement. While they're getting ready, the crew of train G50 is also preparing for its shift.

The layout

Through the years, after much trial and error, a few standards have developed regarding the layout. The layout is powered by NCE DCC, which replaced an earlier Lenz system. NCE is preferred for ease of use and the ability to support advanced consisting.

Along with the NCE system is a new controller from Iowa Scaled Engineering called the ProtoThrottle. This device is just like having a miniature control stand in the palm of your hand. It allows me to operate my models similar to the prototype, and it works well with the NCE system. [It will also work with most other DCC systems –*Ed.*] I rarely use my other throttles now because the ProtoThrottle makes operating trains so much more fun and realistic!

The track is all Micro Engineering code 83. I prefer Micro Engineering due to its realistic appearance. The minimum radius on the layout is 24". From my experience, anything tighter than 24" can cause a derailment with some of the modern equipment that I have operating on the layout.

Backdrops on the layout are all commercial photo prints from Trackside Scenery. When I updated the layout, I ended up installing these photo backdrops on large styrene sheets. Then I used double-sided tape to mount the styrene sheets to the wall. This way all of the backdrops can be preserved and used again on any future version of the SC.

The layout is mostly made up of 24"-wide sections. Many are 7 to 8 feet long. The height of the railhead is 40" from the floor. A future version would be between 48" and 54", which is a much more reasonable height for a single-level layout.

Most of the rolling stock on the layout is equipped with ExactRail code 88 metal wheels and Kadee semi-scale couplers. I really appreciate the more realistic look of the narrow wheels and semi-scale couplers. To me, it's the same effect as the change from code 100 to the more realistic Micro Engineering code 83 flextrack. I've had no issues with the narrow code 88 ExactRail wheels operating over my Micro Engineering track.

To make the rolling stock even more realistic, an effort is being made to equip all cars with uncoupling levers and magnetic air hoses. Also, the cars are being weighted to improve performance on an as-needed basis.

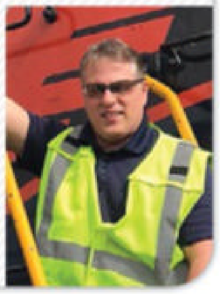
I aim to weather everything on the layout. However, my recommendation for any model railroader is to start by weathering the track and the wheelsets first. Rail and wheels tend to be a raw umber color, but can vary depending on usage and age.

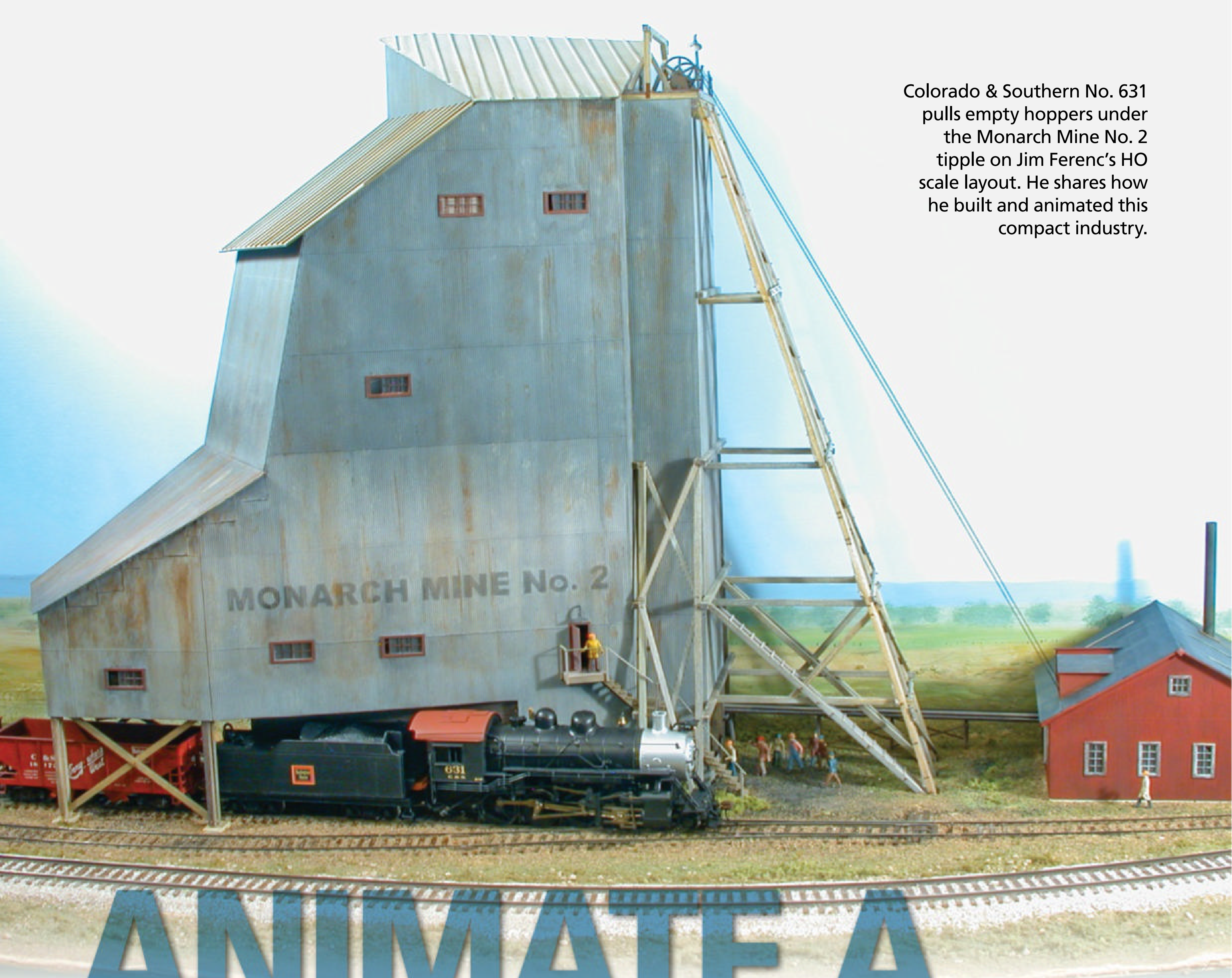
Crossties range from gray to dark brown, and rail car trucks can be anywhere from flat black to raw umber depending on how long the car has been in service. Just weathering these two items will completely transform a layout into a great-looking model railroad.

This version of the SC has been a great learning experience and a joy to operate. Along the way, mistakes have been made, but in the end, they have made me a better modeler. The satisfaction I have reached from this layout and watching it develop into what it is today drives me to continue to learn and grow in the hobby. MR

Meet Tim Garland

Tim Garland, a Norfolk Southern locomotive engineer, has been passionate about trains since childhood. When he is not working on the prototype, he can be found moving freight on the Seaboard Central.





Colorado & Southern No. 631 pulls empty hoppers under the Monarch Mine No. 2 tipple on Jim Ferenc's HO scale layout. He shares how he built and animated this compact industry.

ANIMATE A COAL MINE

Spinning headframe wheels add to the realism of this HO scale structure

By Jim Ferenc • Photos by the author

Monarch Mine No. 2 on my HO scale Colorado & Southern Northern Division needed a tipple structure to cover its coal loader mechanism. The tipple had to include the massive timber headframe found on the prototype. I also wanted to animate the hoist cables and sheave wheels at the top of the headframe.

The coal loader is the twin of the one I described in the July 1999 issue of *Model Railroader* magazine. Wedged into just 6" of space, the plan shows the tight track clearances that require precise positioning of the tipple.

I primarily used styrene and stripwood to build the tipple. Adding animation increased the visual impact of the compact, rail-served industry. Even if you don't model this specific coal tipple, you can adapt the techniques shown here to other modeling projects. MR

Jim Ferenc lives in Boulder, Colo. He models the Colorado & Southern in HO.

GETTING STARTED

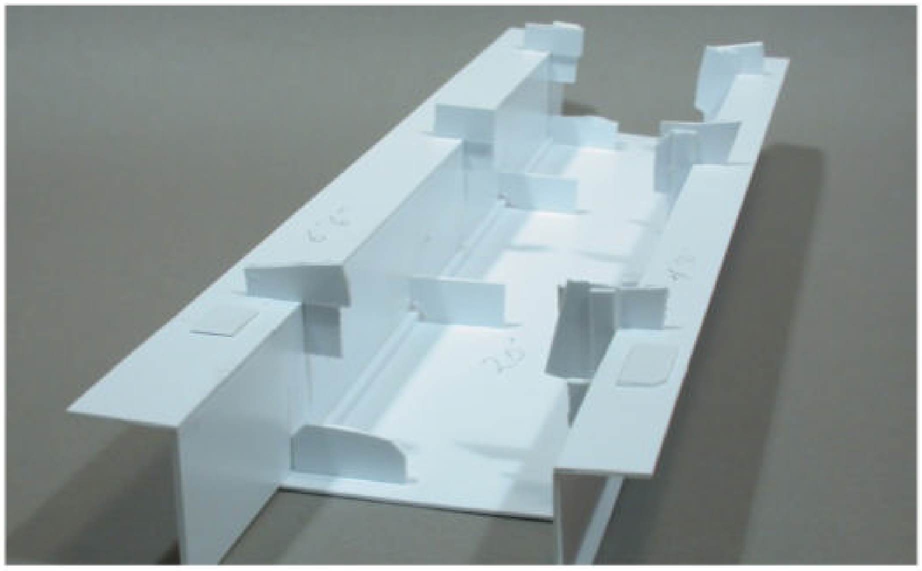
Working from the plan on the next page, I drew each tipple wall full-size on paper and tested it on the layout before committing it to styrene. After building a wall, I cemented it to the growing tipple at my workbench and checked the tipple on my layout. I then drew the next wall.

I scratchbuilt the tipple from .040" spacing metal siding sheet styrene (Evergreen 4526). I spliced sheets together with styrene cement to form the larger sides, ensuring a good match between adjoining groove patterns. I reinforced the splice joints with styrene scraps cemented to the back.

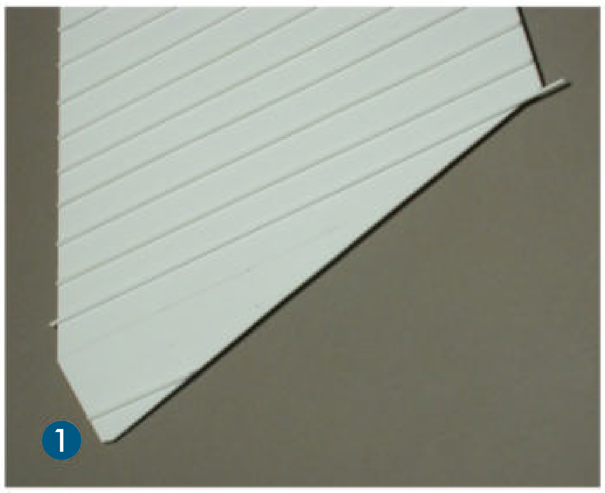
Next, I marked and cut sides from the larger sheets, along with window and door openings. I scribed horizontal lines every 13½ scale feet to represent sheet metal courses.

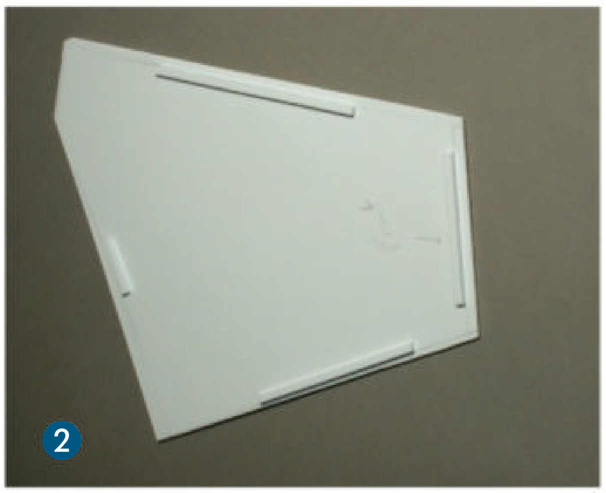
I started with the tipple's shaft enclosure, building it as a strong spine with plenty of bracing to withstand handling between my workbench and layout.

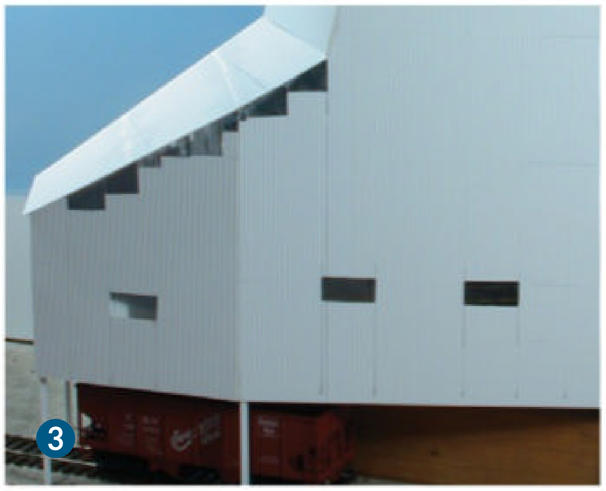
I built the rear wall from heftier .060" plain styrene sheet (Evergreen 9060), since it wouldn't be visible against the backdrop. I cemented the rear wall to the shaft enclosure with .100" square styrene strips (Evergreen 175) and .060" gussets as reinforcement, as I did for all the walls.



STANDING-SEAM ROOFING







I cut the two lower roofs from metal siding sheet styrene, thinned the edges with a file, and cemented them in place.

The two highest tipple roofs were cut from styrene sheet with .040" square ribs (Evergreen 142) attached ①. These roofs are removable, the upper to see the shaft positioning pins when installing the model and the lower for access to the coal bin for refilling. I attached .100" x .100" styrene strip to the underside of the roof to ensure a good fit ②.

Design changes left gaps along the roofline of the left front wall. I made siding patches by pressing aluminum foil between two scraps of metal siding sheet styrene in a vise. Then I trimmed the foil and patched the gaps ③.

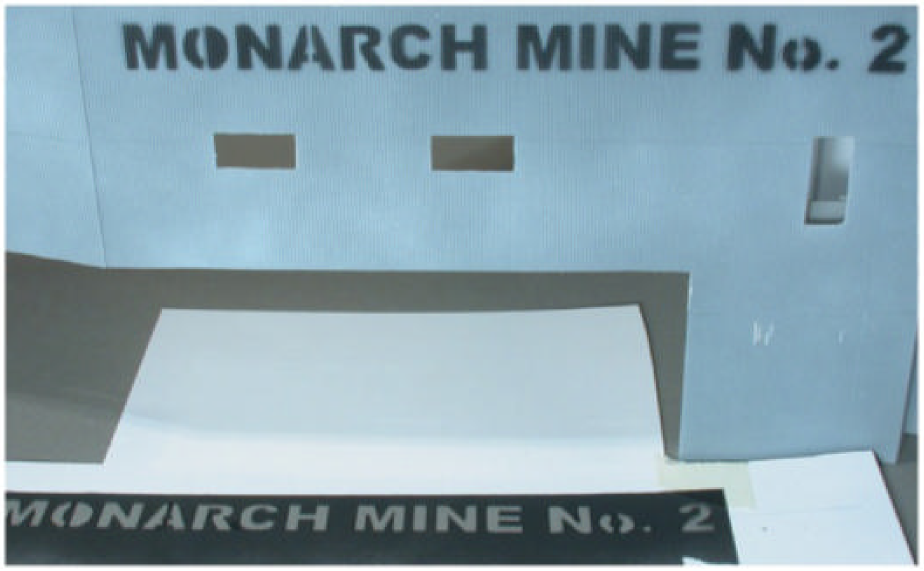
FINISHING THE TIPPLE SHELL

I painted the walls and roof with gray primer, lightened with an overspray of white paint. I printed a cardstock stencil for the tipple sign on my computer and cut out the letters. Then I held the stencil against the siding and sprayed the lettering with Engine Black acrylic paint. I touched up the bridging and bleeding with Concrete acrylic paint.

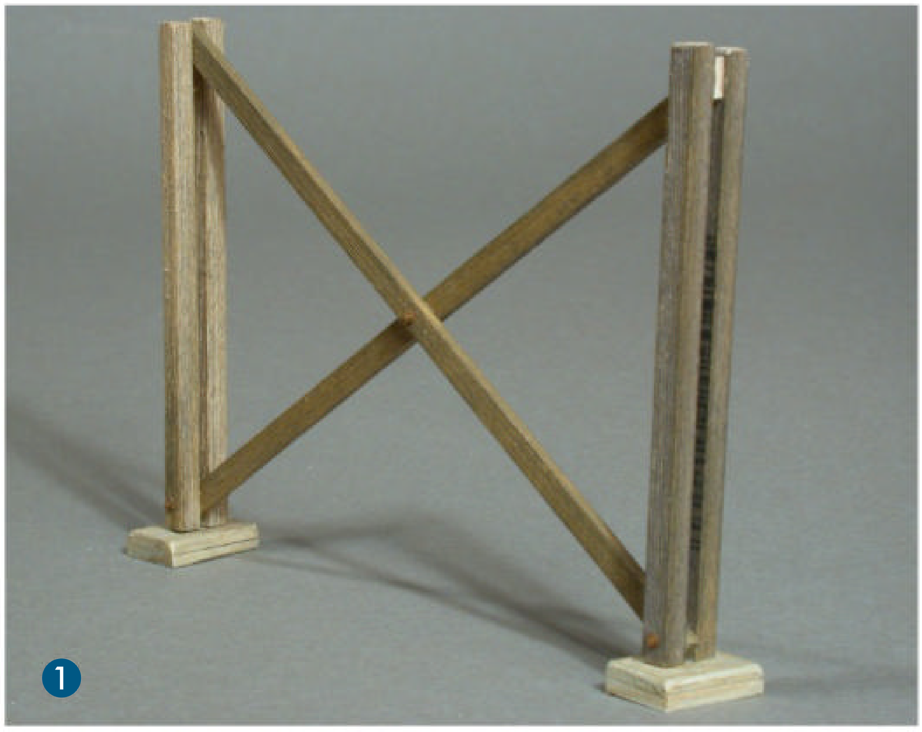
I brush-painted the Micro Engineering No. 80-064 window frames Light Tuscan Oxide Red. Then I added clear styrene glazing and installed them.

I weathered the tipple by drybrushing Concrete and Rail Brown paint. When dry, I followed with washes of Rail Brown and India ink (2 teaspoons of ink to 1 cup of alcohol).

I sealed the weathering with Testor's Dullcote, which dirtied the window glazing and hid the interior.



ANCHORING THE LEFT END



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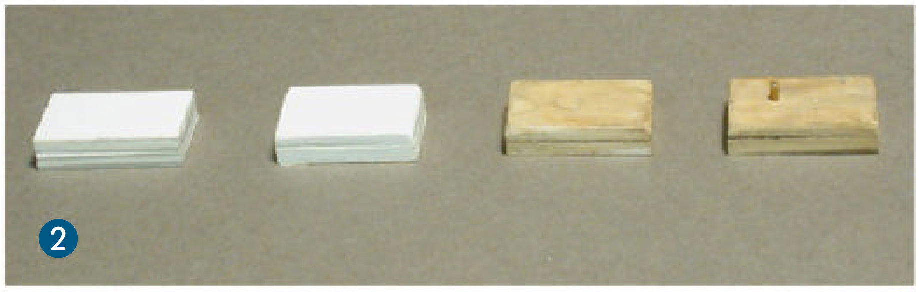
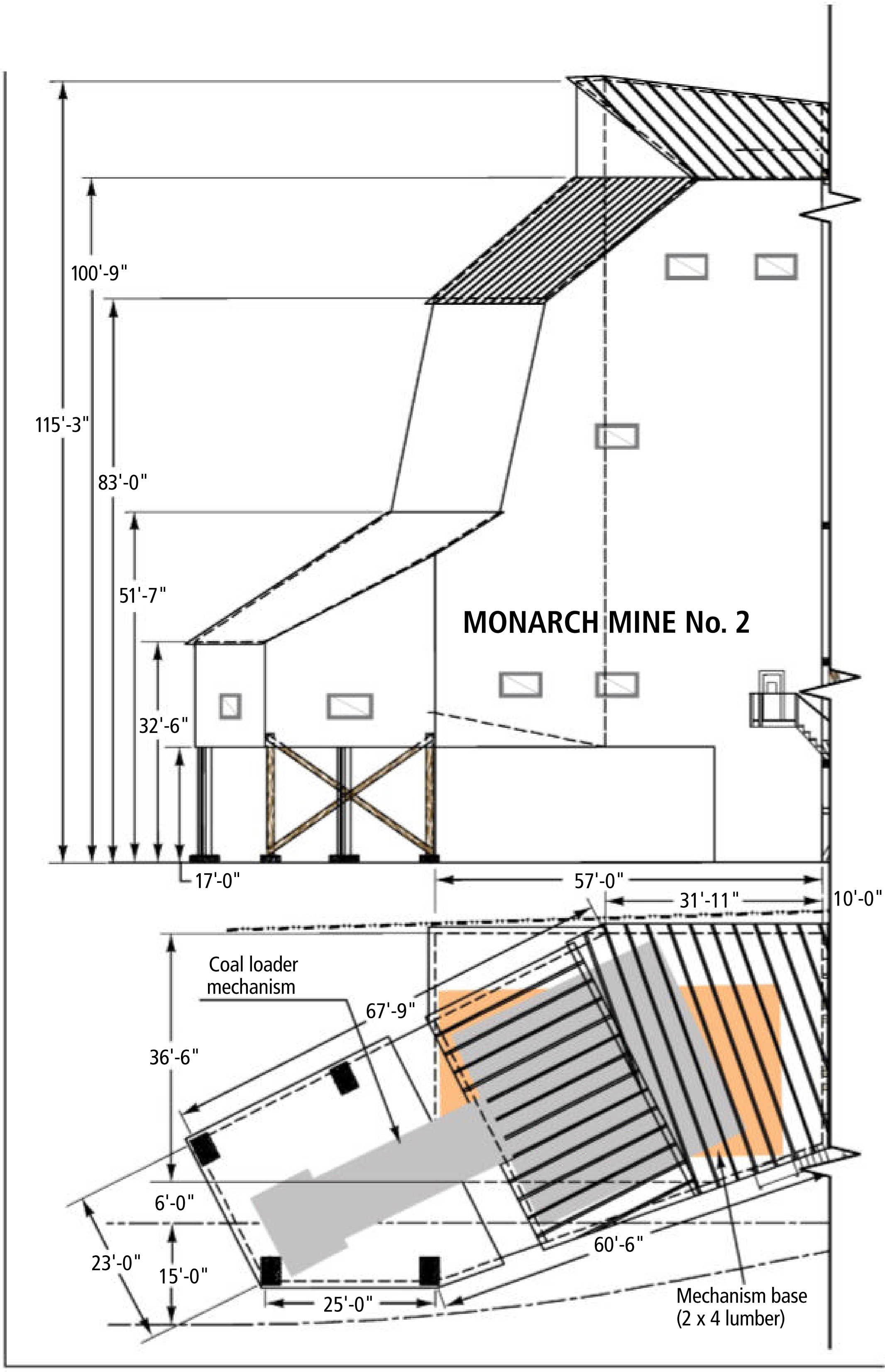


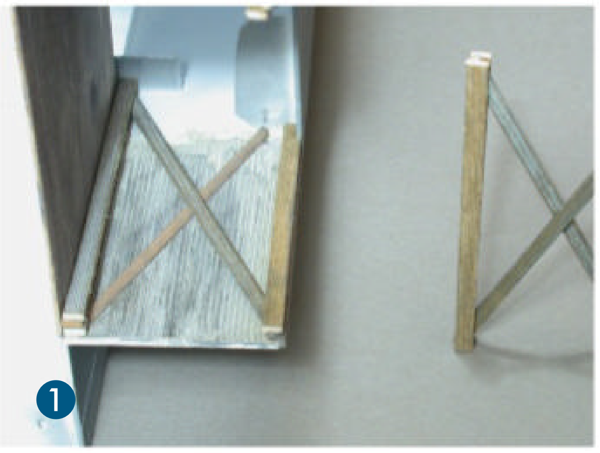
②

Post assemblies for the tipple overhang are ⅛" square strip wood with ¹⁄₁₆" x ⅛" cross bracing and No. 5093 n.b.w. castings painted Rail Brown ①. I added woodgrain to all stripwood with a razor saw blade, followed by brown and India ink washes. I built concrete footings from styrene ②.

Then I positioned the tipple on the layout. I glued the top of the post assemblies to the tipple with cyanoacrylate adhesive (CA). I made sure the posts were vertical before gluing the footings to the layout surface.



FOLLOWING THE PROTOTYPE'S LEAD



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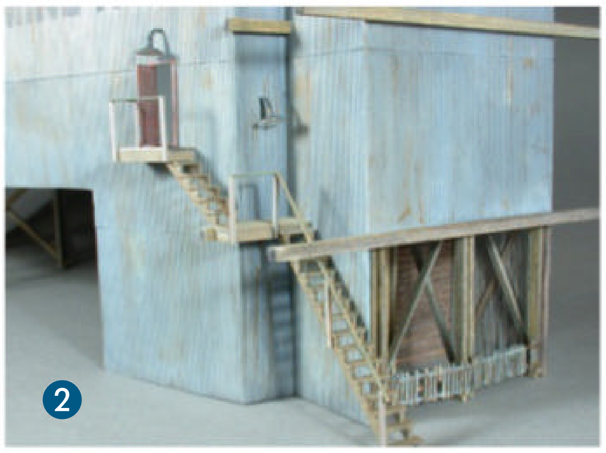


②

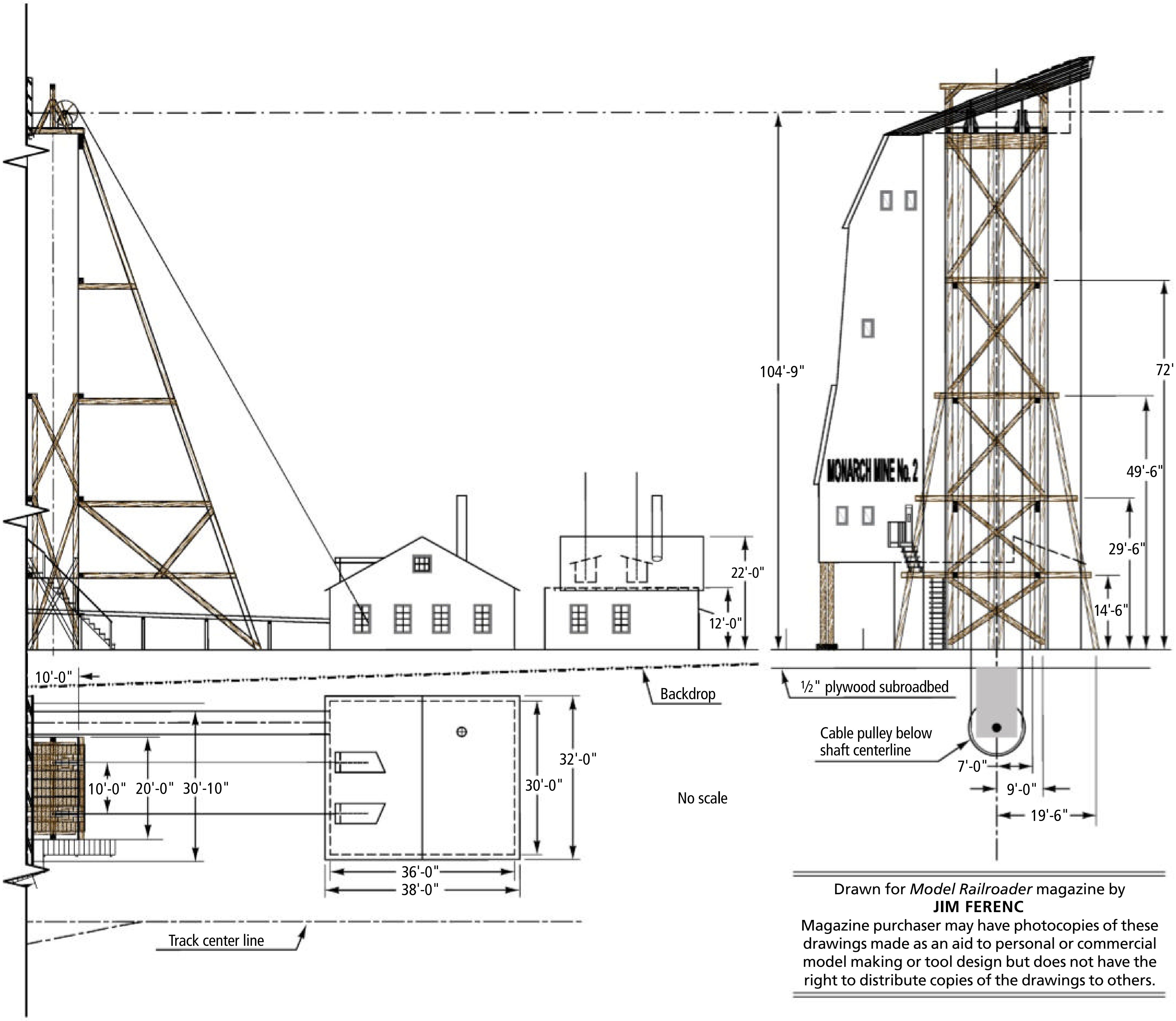
The prototype tipple is a wood timber structure sheathed in corrugated steel. I detailed the visible rear and left sides of the shaft interior to match. First, I glued more of the pressed aluminum foil siding to the rear shaft wall. I then added posts and cross bracing timbers, as shown in ①. I notched the timbers to imply thin corrugated metal sheathing.

Next, I finished the shaft entrance with a heavily weathered picket fence gate from a Central Valley fence kit (1601). I sanded the backing rails thinner, then brushed the gate with Concrete, Rail Brown, and Grimy Black paint.

I glued a scale 2 x 4 wood strip diagonally across the back and attached the gates intentionally crooked to the shaft timbers to match the prototype. I finished by gluing paper hinges stained with a brown marker in place.

I cut and glued seven ⅛" square headframe beams going up the tipple wall above the shaft entrance (three are stacked together at the top) and two each on the short walls to the front and rear of the shaft enclosure. The headframe main and side struts attach to these beams.

For the stairs, I brush-painted Central Valley injection-molded plastic stair treads (1602) Rail Brown and randomly drybrushed them with streaks of Reefer White and Grimy Black ②. I built the platforms and railings from scribed sheet wood and 2 x 4, 2 x 6, and 4 x 4 stripwood.


104'-9"
72'
49'-6"
29'-6"
14'-6"
22'-0"
12'-0"
MONARCH MINE No. 2
10'-0"
Backdrop
½" plywood subroadbed
Cable pulley below shaft centerline
7'-0"
9'-0"
19'-6"
10'-0"
20'-0"
30'-10"
32'-0"
30'-0"
36'-0"
38'-0"
No scale
Track center line

Drawn for *Model Railroader* magazine by
JIM FERENC
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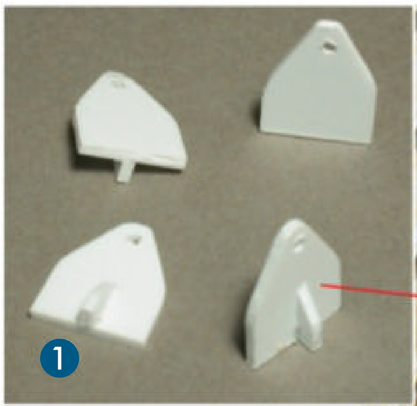
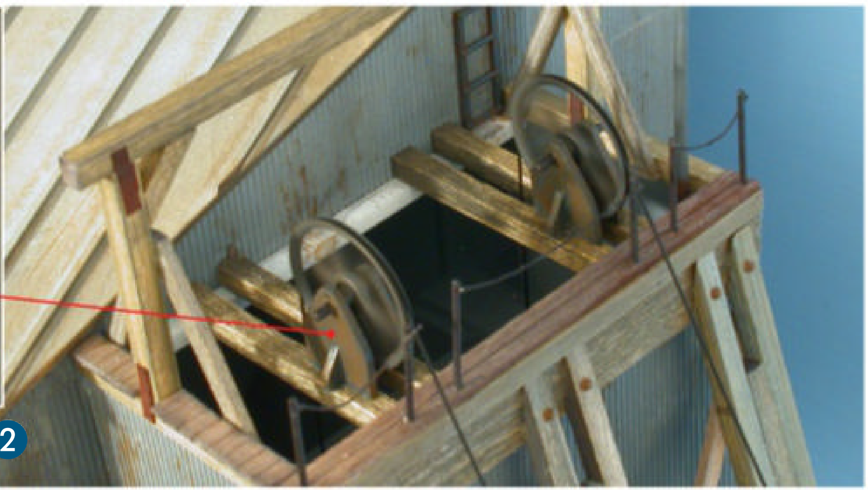
SHEAVE WHEELS AND PLATFORM





I made sturdy brackets for the Grandt Line sheave wheels as shown in ①. I blackened two ⅜" lengths of 3⁄64" brass rod for the axles. I centered and glued the wheels to the axles with CA, and then unevenly brush-painted the wheels and brackets Rail Brown and Grimy Black for a used, industrial look.

A pair of ⅛" stripwood beams support each sheave wheel and its brackets ②. The beams, and another two at the front and rear of the platform, rest on an unpainted .125" square styrene strip and the topmost headframe beam on the outside wall of the shaft enclosure.

Next, I threaded each axle into its brackets and glued the brackets to their support beams. The platform is more than 6 feet above the layout room floor, so I glued just enough scribed sheet wood around the edge to give the illusion of flooring. I glued all wood-to-wood joints with yellow carpenter's glue, styrene-to-styrene with plastic cement, and styrene-to-wood with CA.

Then I built the cable beam assembly above the platform from ⅛" square and 1⁄16" x ⅛" stripwood and No. 5046 n.b.w. castings. The angle iron details are paper strips.

I finished off the platform with blackened lengths of 1⁄32" brass rod and brown thread as railing.

TIMBER HEADFRAME

I scratchbuilt the headframe from stripwood and n.b.w. castings prepared as before. Beginning with the side struts on the front and rear of the shaft enclosure, I angle-cut ⅛" square stripwood struts per the plan.

With the tipple firmly taped to a flat surface (my workbench is topped with laminate), I aligned the struts with the headframe beams on the tipple. Then I installed No. 5046 n.b.w. castings in the struts and glued them to the headframe beams.

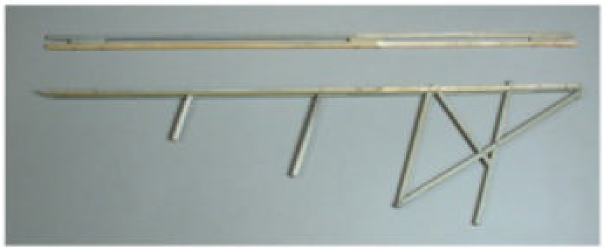
I added n.b.w. castings to the front side 1⁄16" x ⅛" cross braces and glued them in place. I glued the rear side cross braces in place without n.b.w. castings, since they aren't visible from normal viewing angles. I added their counterparts to the front of the struts.

MAIN STRUTS

The three main struts to the right of the shaft enclosure are double beams spaced a timber's width apart. I began by cutting top and bottom angles on six ⅛" square wood strips. I made a fence template for my NorthWest Short Line Chopper to ensure identical cuts.

The prototype spliced timbers into struts more than 100 feet long. To replicate this, I lightly cut three strips on all four surfaces 50 scale feet from the bottom, and the other three strips at 54 scale feet. I finished the wood differently above and below the cut. In addition to a light sanding, I added woodgrain and applied a brown or India ink wash. I made sure the difference was sharply defined by the light cuts.

I then paired up the 50 footers with the 54 footers, gluing the pairs together with 6 scale foot long ⅛" square strips as spacers. I added pairs of No. 5046 n.b.w. castings on either side of the cuts. Since the bolts go through all three timbers at the splice, I added pairs of n.b.w. castings on the opposite timber.



The inner strut ties to the tipple at the top only. The outer struts tie into the headframe beams on the tipple with horizontal beams bolted between their double timbers, and with angled double beams from their base. I added these beams to the outer struts, along with No. 5093 n.b.w. castings. I positioned, but didn't glue, the top two and bottom horizontal beams in place.

Then I glued the struts to the headframe. I finished by cutting 1⁄16" x 3⁄32" cross braces, adding Grandt Line No. 5099 n.b.w. castings, and attaching them.

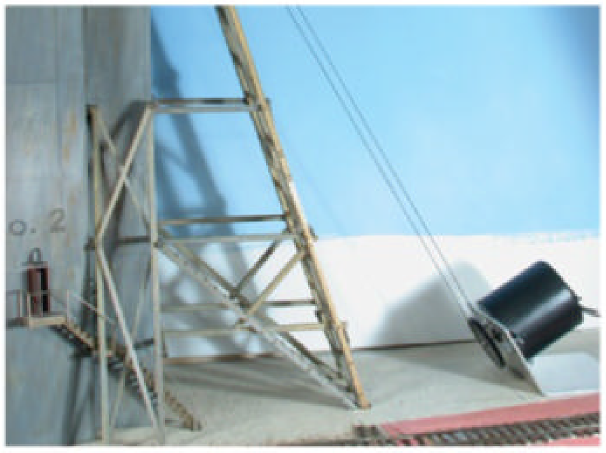
HOIST CABLE, MOTOR, AND PULLEY

I made the hoist cable by bonding the ends of a length of black carpet thread with CA, forming a loop. The cable is driven by a pulley wheel on the hoist motor. It loops over one sheave wheel at the top of the headframe and down the shaft, turns on the benchwork pulley beneath the layout, and returns up the shaft and over the other wheel.

I salvaged two pulley wheels from a VCR. Their diameter roughly matches the distance between the sheave wheels.

I cut the motor bracket from 1⁄16" aluminum sheet and drilled holes using the template with the Switch Master (1001) stall motor kit. I bent the bracket, installed the motor, and attached a pulley wheel to the motor shaft with epoxy.

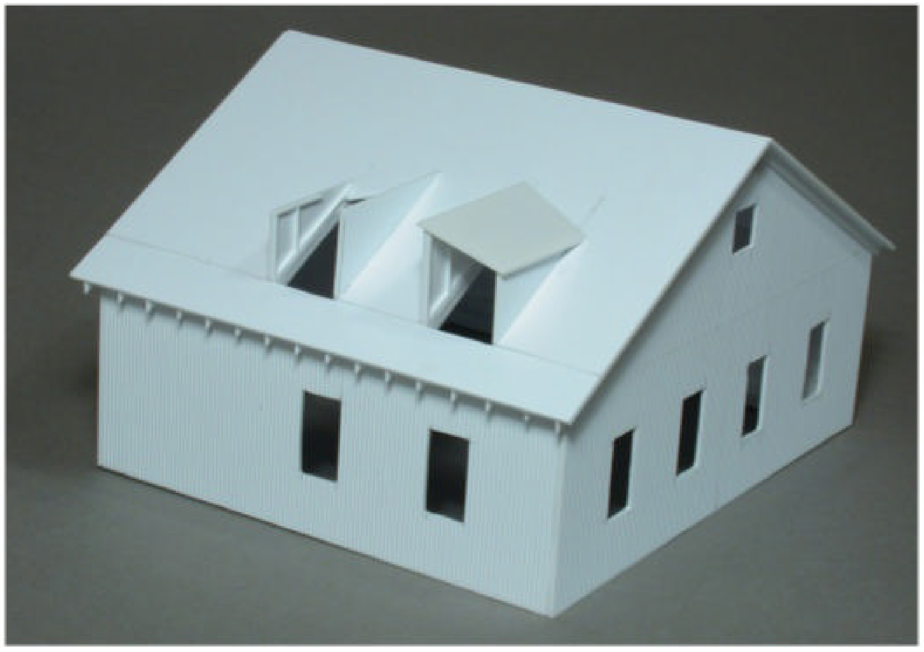
Next, I aligned the motor bracket on the layout and screwed it to the layout surface with No. 8 pan head wood screws. I lengthened and fished the motor wires through a ¼" hole in the layout surface.



I made the pulley bracket from the aluminum sheet, drilling 1⁄16" holes for the pulley axle and a pan head wood screw.

I soldered a 1⁄16" brass rod inside a 3⁄32" brass tube to make the axle. I attached the wheel to the center of the axle with epoxy and slipped the axle into the bracket. I screwed the pulley to the underside of the layout.

HOIST HOUSE

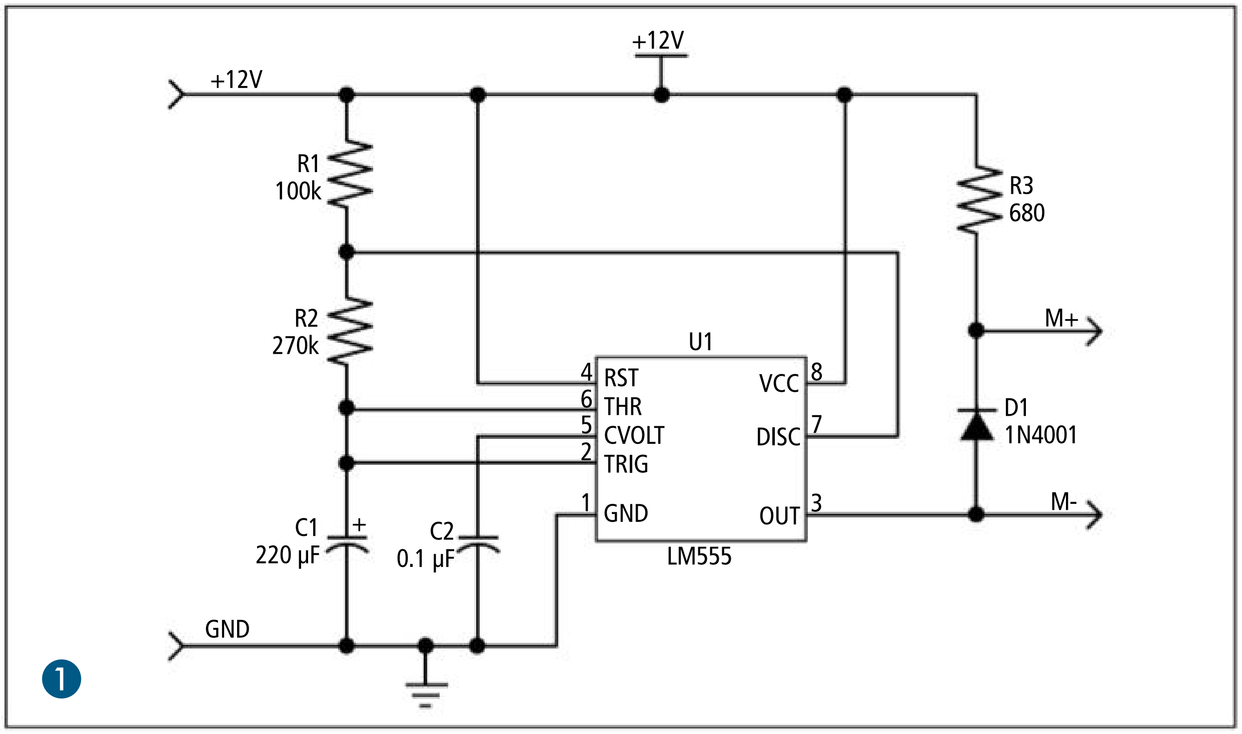


I built the hoist house from metal siding sheet styrene. The roof is .040" plain sheet (Evergreen 9040) with .020" x .080" rafters (Evergreen 124) under the eaves. I built hoist cable roof ports on the roof facing the tipple and made the roof removable from the bottom of the ports to the peak for easy threading of the hoist cable.

After accurately positioning the hoist house over the motor, I glued lengths of .125" square styrene (Evergreen 186) to the layout surface to exactly fit its interior sides. This holds the removable hoist house in place. I made a foundation from .060" x .188" styrene (Evergreen 158).

I trimmed the sills from Grandt Line Nos. 5112 and 5251 window castings. The stack is blackened ¼" brass tube, long enough to embed in the layout surface. I used scale 3'-6" wide strips of tissue paper, painted Grimy Black, to simulate tar paper roofing.

HOIST MOTOR DRIVER CIRCUIT



Materials list

Digi-Key
493-1041-ND 220 µF, 16V electrolytic capacitor (C1)
478-5741-ND 0.1 µF ceramic capacitor (C2)
3845-1N4001-ND 50V, 1A diode (D1)
13-CFR-25JR-52-100KCT-ND 100k ohm resistor (R1)
270KQBK-ND 270k ohm resistor (R2)
680QBK-ND 680 ohm resistor (R3)
LM555CNNS/NOPB-ND timer (U1)
Jumper wire (J1-J3)

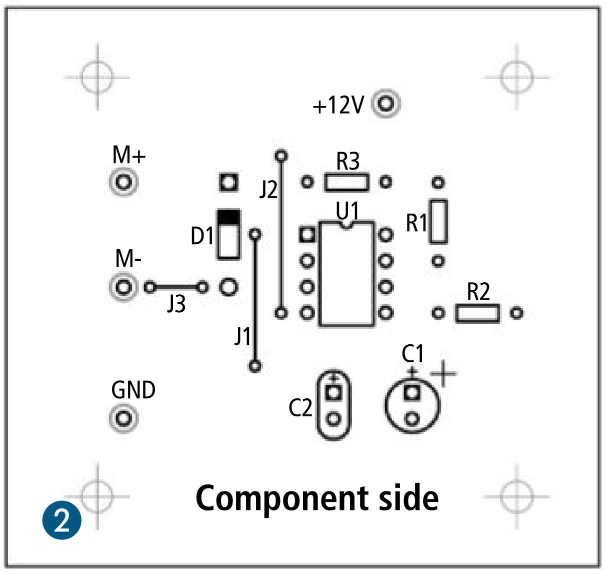
RadioShack
276-1396 perfboard

I built a simple circuit to alternately turn and stop the hoist motor. The circuit schematic is in ①. I got the perfboard from RadioShack; the rest of the items can be found at Digi-Key.

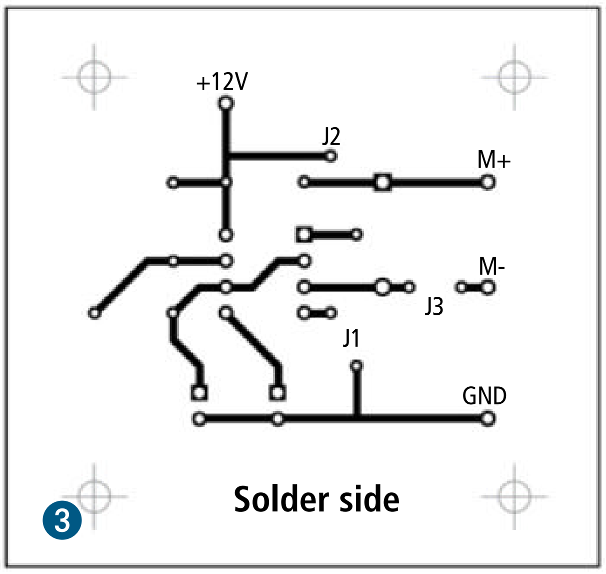
The printed-circuit (PC) board layout is shown in ② and ③. I cut the perfboard using the circuit layout as a pattern, drilling ⅛" holes in the corners.

I taped a copy of the circuit layout to the perfboard, aligning the component holes on the diagram with the perfboard holes. I taped the component side on one face of the perfboard and the solder side on the other, with the top edge (+12V) aligned on both faces.

As I inserted each component, I bent its leads to make the necessary connections as shown by the traces on the solder side. When I finished, soldered leads covered each circuit trace.



The banded end of D1 and positive terminal of C1 are marked on the board layout. I inserted D1 to match, and C1's long lead through the positive hole. Make sure the dimple on the end of U1 matches the dimple on the board layout.



Finally, I connected the circuit to my railroad: +12V to the positive terminal of a 12V supply, GND to the negative terminal, and M+ and M- to the motor leads. The spinning wheels tell us that Monarch No. 2 needs a coal turn today!

A RAILROAD FOR THE FUTURE

Planning for possible downsizing, Doug Kirkpatrick adds a standalone waterfront shelf layout to his HO scale Virginia & Western

By Douglas Kirkpatrick • Photos by the author

① Seen through the float bridge, Virginia & Western Alco S2 No. 6 is switching Marine Power and Parts on the Tidewater Division waterfront. Doug Kirkpatrick built the 17-foot-long standalone shelf addition to his layout so he will have a smaller model railroad to run if he has to move or downsize.

My 45-year-old Virginia & Western RR is a relatively large layout that requires continual maintenance for reliable operation. Since this might become too difficult in the future, I wanted to build a smaller railroad that would be portable and easy to maintain. I also wanted a waterfront district to accept merchandise from the car float at Amy Port on my current layout.

I found a space approximately 15 inches wide and 17 feet long, sufficient for a shelf-type railroad, directly across the aisle from Amy Port. The new Tidewater District has many industries, a wharf, and a car float that provides the source of rail cars. The railroad is self-contained using a small diesel locomotive for power.

Design criteria

I haven't embarked on any new construction on the V&W in decades, so the Tidewater District gives me a great opportunity to use new products and techniques to shorten the construction time. The 15" wide shelf had to be narrowed at one end to accommodate for the aisle, but even with this restriction, there's still plenty of railroad.

I decided to use the Walthers three-track car float because it would handle at least twelve 40-foot cars. I arranged the sidings along the railroad so that there are an equal number of trailing-point and facing-point switches.

I also limited the length of the only runaround so I can't remove or replace an entire string of cars from the float at once. After all, my objective is to keep an operator engaged for an entire 3-hour operating session.

Because I enjoy handlaying track, I included several crossovers to make the trackwork a little more interesting. At the opposite end from the car float, I placed a small engine shed and a fuel track for the diesel switcher. The overall length of the layout could have been shortened to accommodate a smaller area by moving the enginehouse 4 feet closer to the car float without affecting the operation.

I selected a layout height of 44" for ease of viewing and operation. The downside is that Amy Port, which is directly across from the Tidewater District, is only 38" high. I suppose there must be a dam and locks to get the car floats from one dock to the other.

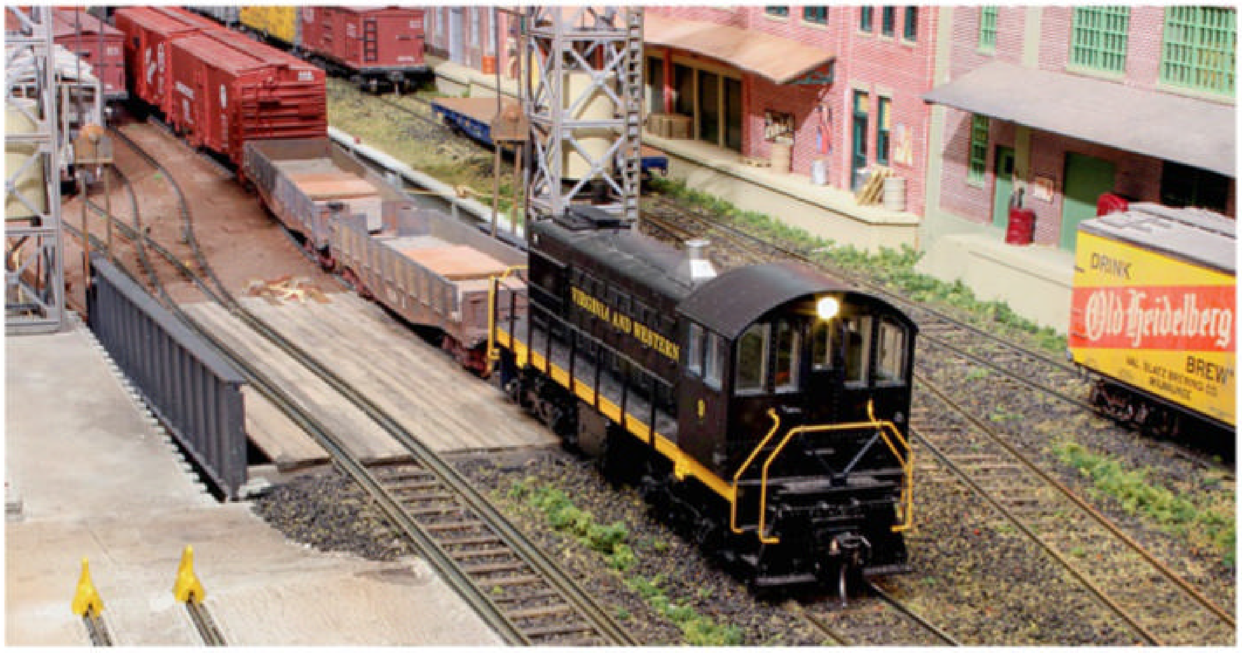
In the past, when constructing the V&W, I laid the track and then pur-

TIDEWATER DISTRICT
VIRGINIA AND WESTERN
FAIRMONT CREAMERY CO.

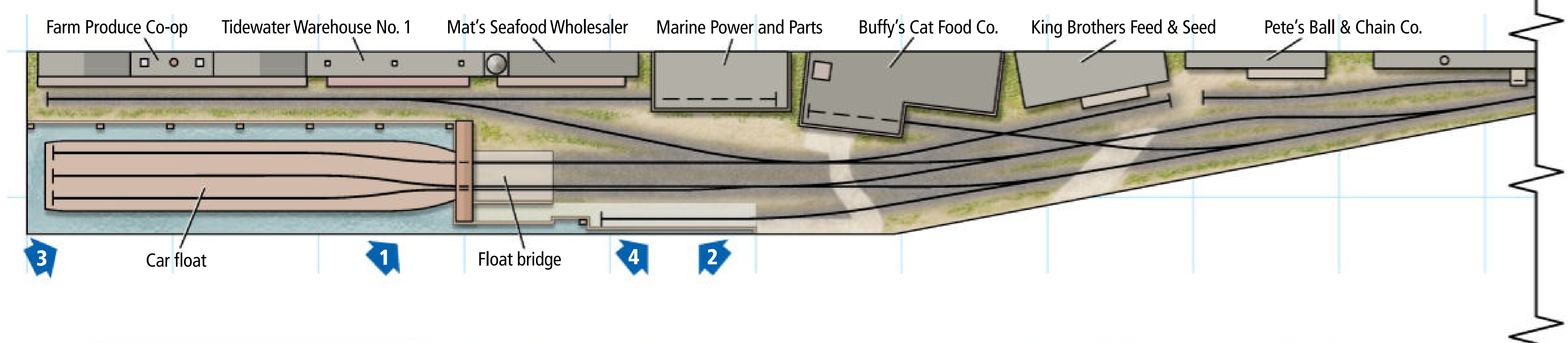
chased or scratchbuilt buildings to fit the space available. This time, I fabricated most of the buildings first, placed them in their relative locations on the floor below the intended space, and planned the cork roadbed to fit them. I then transferred this information to the plywood base. This approach eliminated the need to re-lay a siding because I had provided insufficient clearance in the first place.

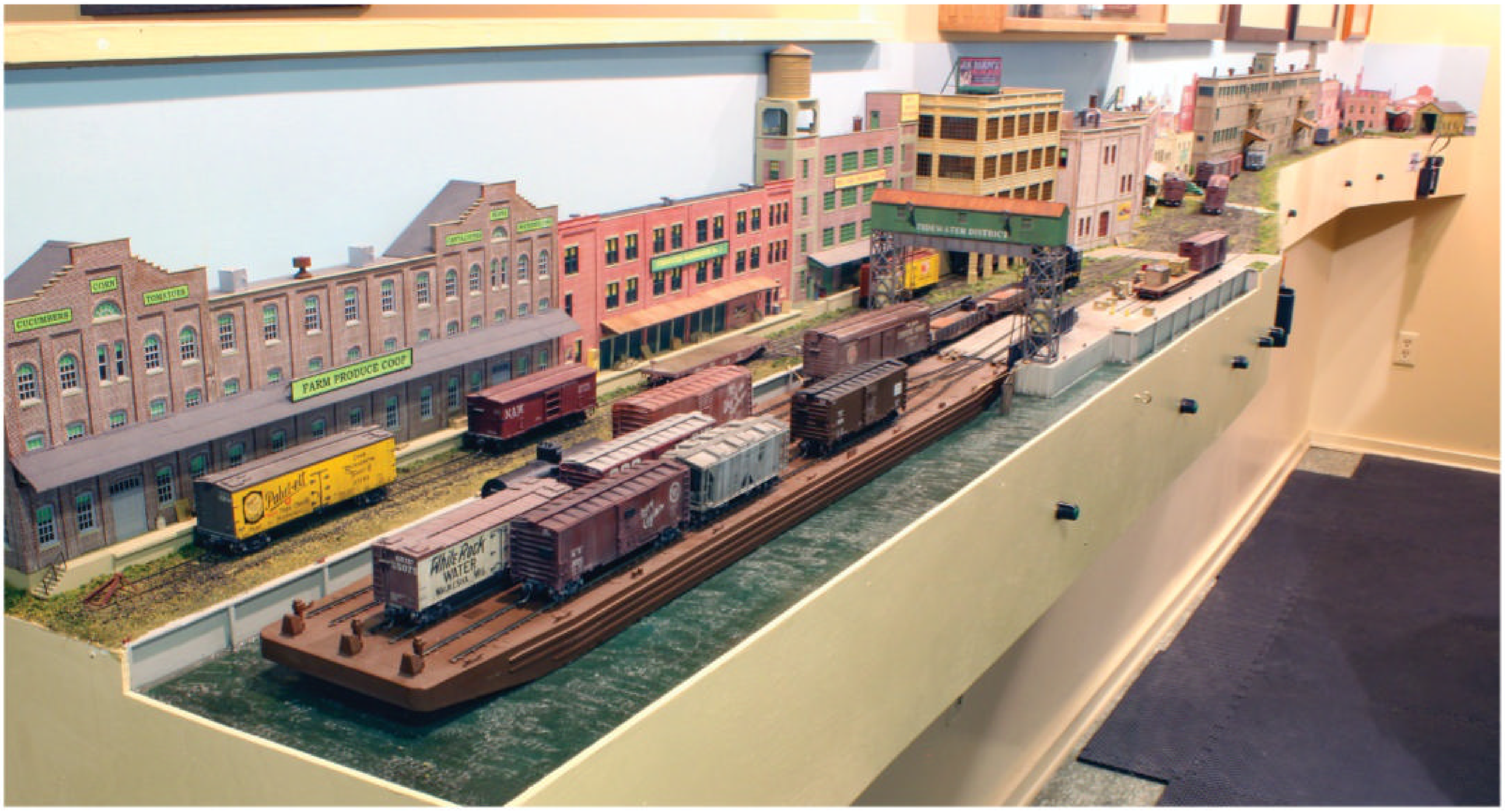
Construction

Because the shelf width is narrow, I supported the plywood base with shelf brackets attached to the wall studs. I placed the brackets approximately 4 feet apart, which was more than sufficient to support the load. However,


VIRGINIA AND WESTERN
DRINK Old Heidelberg BREW

❷ The Walthers car float and float apron kit originally had the turnout points on the apron. Doug built a metal frog on the float and ran the closure rails across the apron gantlet style so he could put the switch points on land, allowing installation of a switch motor.





③ Doug enjoys handlaying track, so he included several crossovers to make the work more interesting. The plan has an equal number of facing- and trailing-point turnouts, which helps keep operation engaging for a 3-hour operating session.

I took care not to install a shelf bracket directly below a switch point, which could have infringed on the location of a switch machine.

I used white glue to attach cork roadbed to the ½" plywood. I then glued strips of wooden ties to the cork and, when dry, lightly sanded the tops to even them out. I wanted to use lightweight rail, since this is a typical industrial switching railroad with small locomotives. I selected code 70 rail because handlaying code 55 rail would be too much of a challenge.

I selected number 5 turnouts, which provided for a compact design yet minimized the misalignment of couplers when shoving cars into sidings. I did not install under track uncoupler magnets; I rely on a manual uncoupler pick for spotting cars.

I attached a 12" high, ¼" thick plywood backdrop rather than paint the sky directly on the wall. The backdrop also provided support for buildings along the back of the shelf.

I also used ¼" plywood for the fascia. By attaching the backdrop and the fascia to the plywood base, a structural beam is formed that results in a solid unit. I designed the shelf with joints every 6 to 8 feet for easy removal in the future.

Float and apron modification

The Walthers car float (933-3152) and matching apron (933-3068) provide an excellent choice to support a waterfront district. I installed code 70 rails on the float and across the apron.

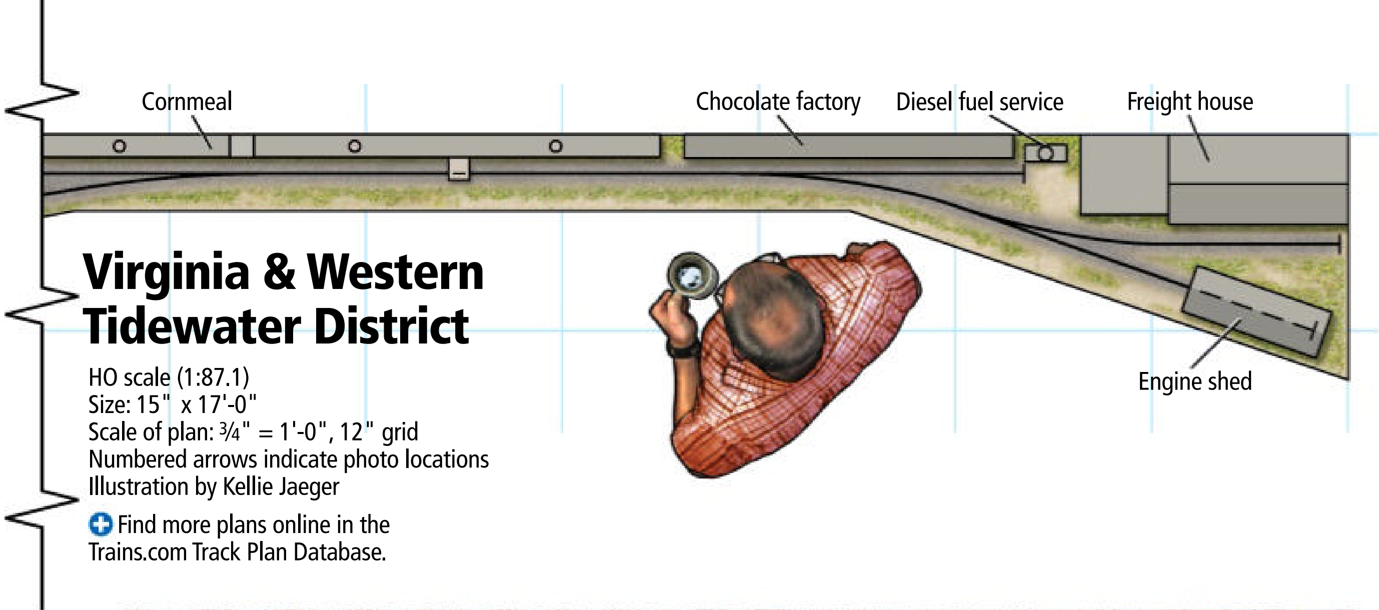
Since the float contains three tracks and the apron two tracks, a turnout is needed. The original kit has the turnout points on the apron deck. I removed the molded frog on the float and discarded the apron deck. Instead, I modified the apron using styrene girders and placed wooden ties on top of them.

I fabricated a metal frog on the molded cleats on the float and ran the closure rails across the entire apron, gantlet-style. The actual switch points were placed on land. Using stripwood, I filled around the rails on the apron. I didn't cut gaps in the rails between the apron and the float or between the apron and land.

Scenery

Because of the limited width of the waterfront district, I built most of the industries from Walthers low-profile background buildings. I also used the Design Preservation Models (DPM) modular building system from Woodland Scenics to construct several other industries.

The wharf is constructed from basswood sealed and painted to resemble aged concrete. There are several areas where the tracks are embedded in the street. To capture the look of street trackage, I placed strips of .060" square styrene along the inside and outside of the rails. I used these strips as a form to spread joint compound between the rails and for the rest of the street. This



Virginia & Western Tidewater District

HO scale (1:87.1)
Size: 15" x 17'-0"
Scale of plan: ¾" = 1'-0", 12" grid
Numbered arrows indicate photo locations
Illustration by Kellie Jaeger

➕ Find more plans online in the Trains.com Track Plan Database.

④ Doug inserted some random complications into his operating scheme to extend how long it takes to switch the layout. One of them is a delivery truck blocking the track to the car float. As soon as the loading doors open, the truck can make its delivery and be on its way, but for now, the train crew is not very happy.

method ensures that the code 70 rail will always be above the street for reliable electrical contact with the locomotive.

The water area beneath the float and around the wharf was sealed by a thin coat of joint compound, lightly sanded and painted. Once I was assured that the area to represent water was completely sealed and level, I mixed a two-part epoxy and slowly poured it to form the water. When the epoxy cured, I installed the float in front of the apron.

I tried to select names for the industries that would be associated with activities along the waterfront. On occasions I operate the V&W at night, so I installed lights throughout the buildings and along the waterfront areas.

Turnout control and track power

Once the handlaid track was completed, I mounted Tortoise by Circuitron switch machines beneath each turnout. I controlled each machine with a three-position rotary switch that was featured in an article by Pete LaGuardia in the July 2017 issue of *Model Railroader*.

I wanted each turnout frog powered for reliable operations of the short-wheelbase switcher. A set of terminals on the Tortoise switch machine is used to provide track power to the frog. I mounted the rotary switches on the fascia directly in front of each turnout.

I installed a single set of bus wires the length of the district and provided track drops so that all rails are directly powered. Digital Command Control (DCC) power was provided to the Tidewater District through a power shield from the main railroad power supply. If an electrical short occurs, it can be contained to this specific area of the railroad.

I elected to use DCC auto-reversers to power the all-metal crossovers rather than wiring them directly to the closest turnout. If the operator forgets to align the turnout after leaving the siding and then runs through the crossover in the opposite direction, the auto-reverser will prevent an electrical short.

The layout at a glance

Name: Virginia & Western RR, Tidewater District
Scale: HO (1:87.1)
Size: 1'-3" x 17'-0"
Theme: Waterfront industrial district
Locale: Mid-Atlantic tidewater
Era: 1948-54
Style: shelf
Mainline run: none
Minimum radius: cosmetic curves
Minimum turnout: No. 5
Maximum grade: none
Benchwork: plywood on shelf brackets
Height: 44"
Roadbed: cork
Track: handlaid code 70
Scenery: tabletop
Backdrop: painted ¼" plywood
Control: Digitrax DCC

Operation

The operation scenario sounds quite simple: move all the cars on the float and at each industry to their correct location via a switch list. But I also provide a few complications. One is that one of the industries' cars cannot be moved until a certain time because the forklift has malfunctioned and the car is being loaded by hand.

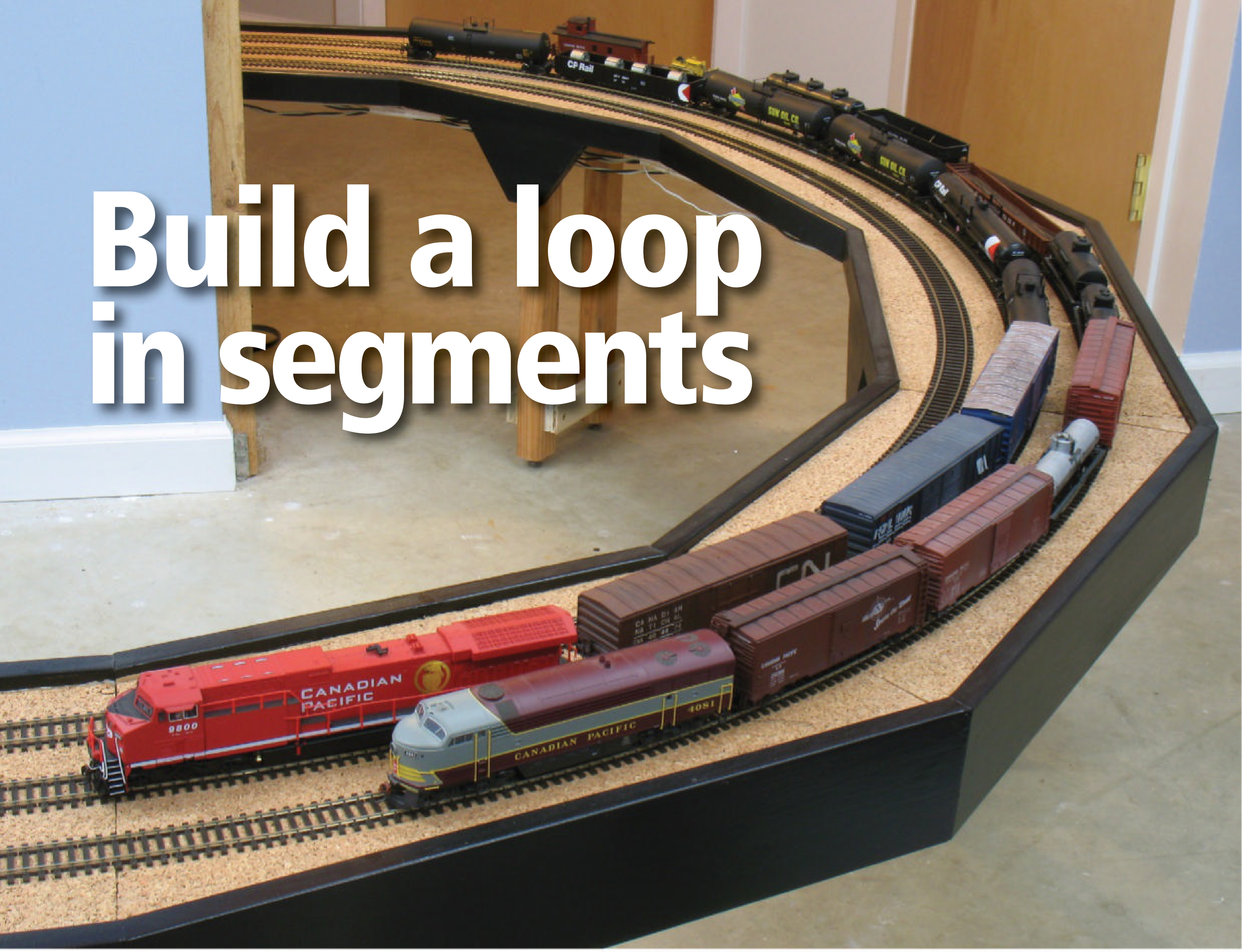
Another complication is that the local foreman forgot to check the amount of fuel in the storage tank available to fill the diesel switcher. With only two hours worth of fuel left, the switcher must retrieve the loaded tank car buried behind other cars on the car float and position it on the refueling track next to the enginehouse.

I also use 9 volts to power the switch machines, which slows down their action. With a top locomotive speed of 15 mph and built-in momentum, the entire operating session takes between 2½ and 3 real hours.

The Tidewater Division is a sought-after assignment by my local crew. I have considered adding overhead wiring and using electric freight motors; however, the operators have strongly discouraged this, since so much manual uncoupling is required. MR

Doug Kirkpatrick, a frequent contributor to Model Railroader *and its special issues, lives in Falls Church, Va. His layout last appeared in our September 2019 issue; his most recent track plan was published in* Model Railroad Planning 2017.

Build a loop in segments



The three-track staging loop on Dave Bonser's HO scale Columbia, Kootenay & Pacific Ry. was built in segments. The plywood trapezoids were ripped on a table saw and cut to the prescribed angle with a miter saw.

Trapezoid-shaped panels made it easy to construct this staging area

By Dave Bonser • Photos by the author

As general manager of the Columbia, Kootenay & Pacific Ry. (CK&PR), a freelance HO scale model railroad, I decided to add a three-track staging area in a return loop at the west end of the main line. Since my construction crew isn't very good at cutting arcs freehand with a jigsaw, I asked the engineering department to design the staging loop as a series of trapezoid-shaped panels.

The engineering department wanted to fabricate the panels off-site as they had a number of smaller pieces of material left over from previous projects that they wanted to use. With the plan in place, the engineering department started work on the loop.

How it works

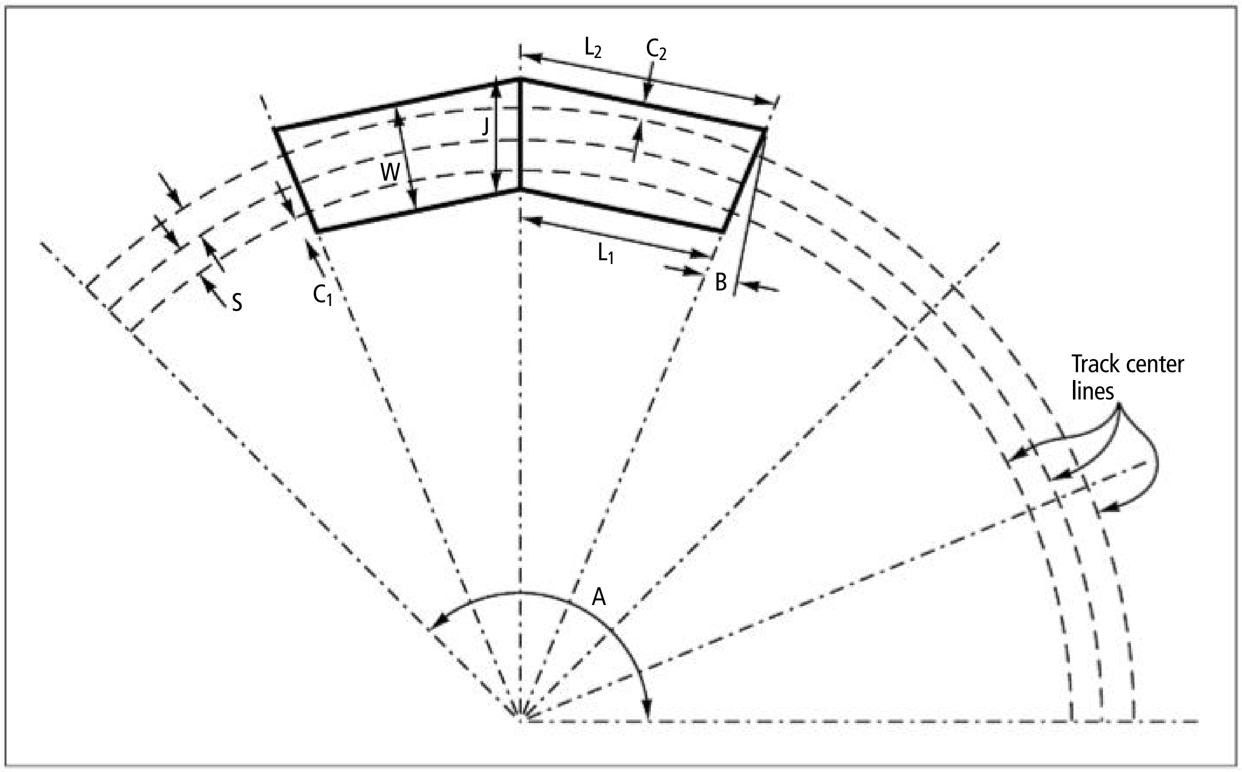
The loop consists of a series of equally sized trapezoidal panels joined on the angled edges to complete the curve. Since the panels are the same width, this allowed the engineering department to rip them on a table saw and cut them to length on a miter saw set to the prescribed angle.

Clearance below wasn't an issue, allowing the panels to be joined from below using small plywood rectangles as splice plates. Glue and screws were used to secure the plates.

The fascia, which extends above and below track level, makes the benchwork more attractive and helps prevent derailed cars from tumbling to the concrete floor below ①, opposite.

Once all of the panels were built, the engineering department brought them to my basement for final assembly ②. This was a simple matter of screwing the panels together through the splice plates. If vertical clearance below the roadbed is an issue, such as a helix, you could modify this assembly method by joining the segments with biscuits and reinforcing

① **Panel components.** Each trapezoid panel includes a plywood splice plate and fascia. The fascia extends above and below the benchwork.



③ **Mapping it out.** This diagram shows some of the factors that determine the dimensions of the trapezoid panels. Among them are the length of the arc (A), the number of segments (N), the radius of the inner track (R), the number of tracks (T), the track spacing (S), and the inner and outer clearances to the edge of the benchwork (C_1 and C_2, respectively). Kellie Jaeger illustration

② **On-site assembly.** The trapezoid panels were delivered to Dave's basement for final assembly. He added cork sheet on top of the plywood before installing the track.

the joints by placing the outer helix spacer blocks over the joints.

Mapping it out

The design choices that determine the dimensions of the trapezoidal panels are shown in ③. These are: length of the arc (A), the number of segments (N), the radius of the inner track (R), the number of tracks (T), the track spacing (S), and the inner and outer clearances to the edge of the benchwork (C_1 and C_2 respectively). Note that the critical inner clearance occurs at the inside of the joint, while the outside clearance point occurs in the middle of each segment.

If you choose to use a larger number of segments for a given arc, they'll be shorter in length and slightly narrower, making a closer approximation to a curve. This method takes more effort to fabricate and join together.

On the other hand, fewer segments use more material and may result in more restricted aisle clearances, since the outside corners stick out farther from the track.

Crunching the numbers

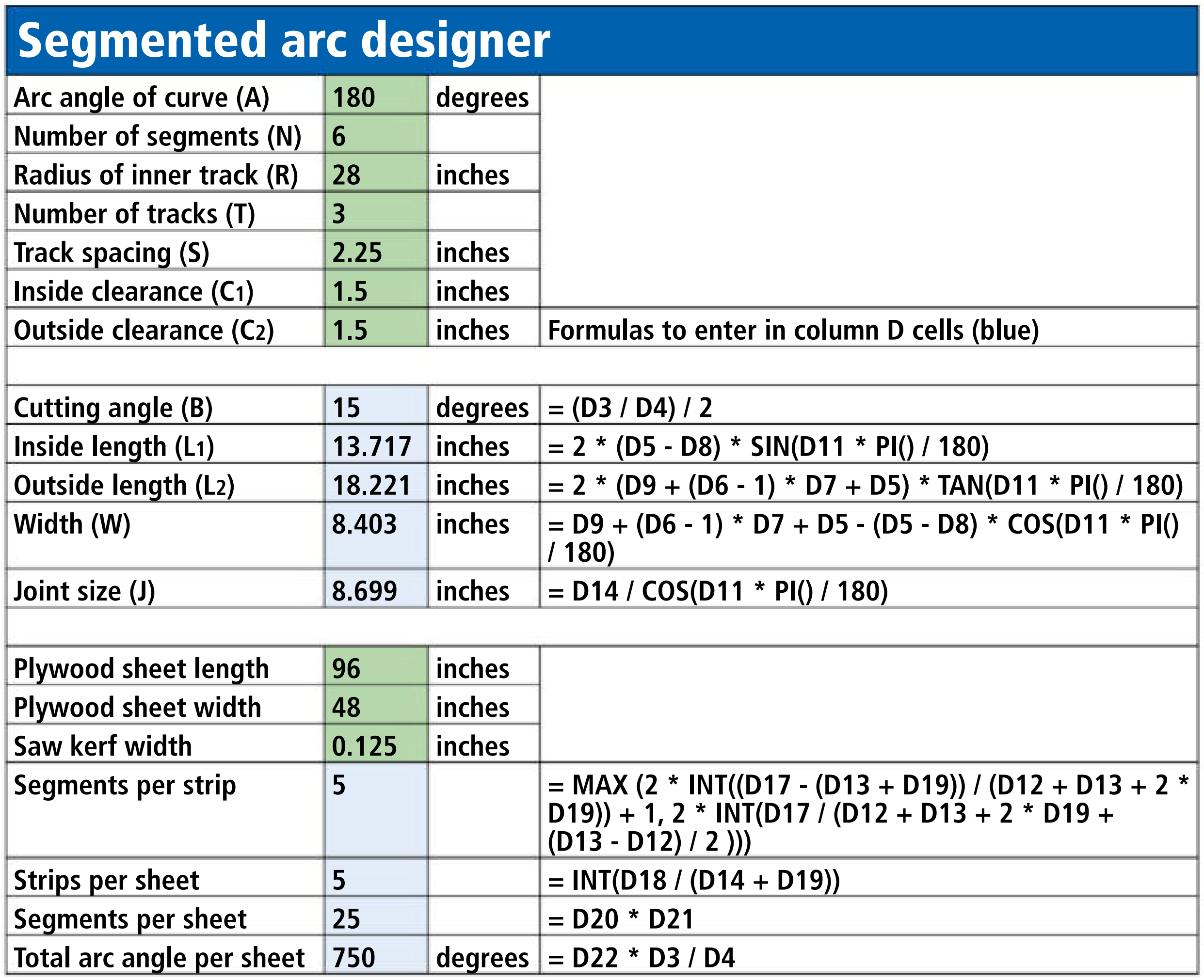
The engineering department created an Excel spreadsheet to calculate the required cutting dimensions. If you have access to Excel on a computer, you can duplicate this spreadsheet by typing in the given formulas in the corresponding cells in column D ④ (next page).

To get new cutting dimensions, enter your preferred values (the green cells) and the results appear in the cells with formulas. Excel assumes that angles are measured in radians, so the angle in degrees is divided by $180/\pi$ in the trigonometric functions. You can also type the formulas in a calculator, being careful to omit the $180/\pi$ conversion from the formula.

The 180 degree curve on the CK&PR staging return loop has three tracks with an inside radius of 28", a track spacing of 2¼", and inside and outside clearances of 1½". Designing the arc with six segments gave us a cutting angle of 15 degrees, a width of $8\frac{13}{32}$", an inside length of $13\frac{23}{32}$", and an outside length of $18\frac{7}{32}$".

The arc joins tangent sections at each end that we cut to have the same width as the joint size of $8\frac{11}{16}$". (To convert from decimal inches given in the worksheet to thirty-seconds of an inch, multiply the decimal fraction by 32 and round to the nearest integer. For example, 0.648 is $\frac{21}{32}$").

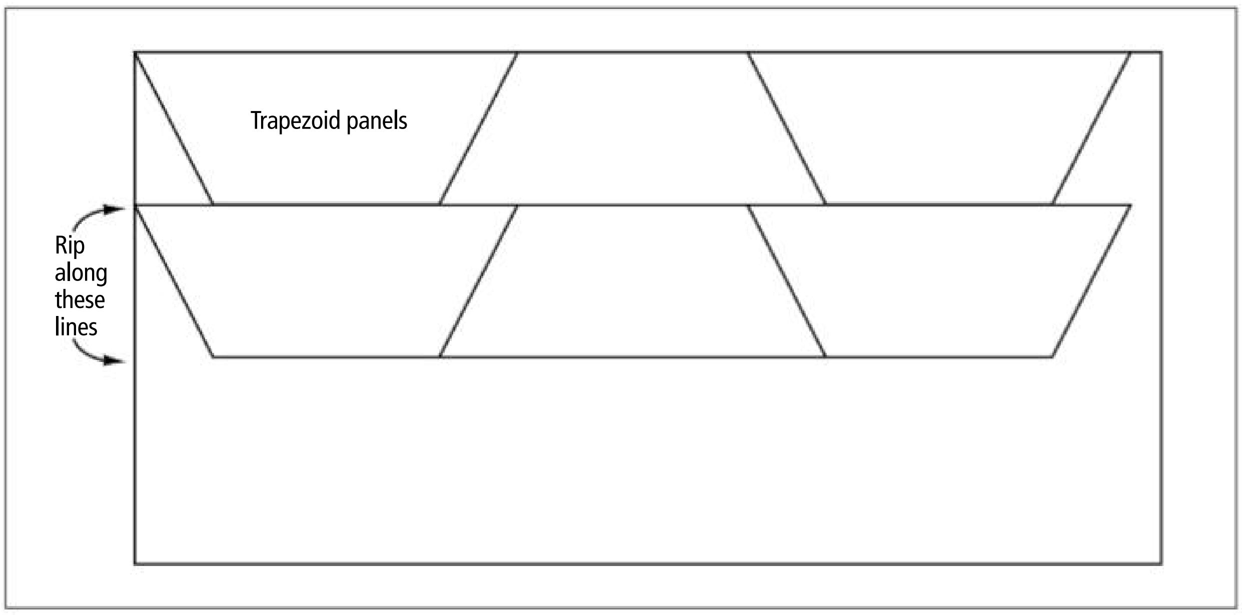
Using Excel lets you try out differing numbers of segments and clearances to obtain desired values of the width or length of each panel. This is an advantage if you're using pre-ripped plywood or trying to maximize the number of



Segmented arc designer

Arc angle of curve (A)	180	degrees	
Number of segments (N)	6		
Radius of inner track (R)	28	inches	
Number of tracks (T)	3		
Track spacing (S)	2.25	inches	
Inside clearance (C_1)	1.5	inches	
Outside clearance (C_2)	1.5	inches	Formulas to enter in column D cells (blue)
Cutting angle (B)	15	degrees	= (D3 / D4) / 2
Inside length (L_1)	13.717	inches	= 2 * (D5 - D8) * SIN(D11 * PI() / 180)
Outside length (L_2)	18.221	inches	= 2 * (D9 + (D6 - 1) * D7 + D5) * TAN(D11 * PI() / 180)
Width (W)	8.403	inches	= D9 + (D6 - 1) * D7 + D5 - (D5 - D8) * COS(D11 * PI() / 180)
Joint size (J)	8.699	inches	= D14 / COS(D11 * PI() / 180)
Plywood sheet length	96	inches	
Plywood sheet width	48	inches	
Saw kerf width	0.125	inches	
Segments per strip	5		= MAX (2 * INT((D17 - (D13 + D19)) / (D12 + D13 + 2 * D19)) + 1, 2 * INT(D17 / (D12 + D13 + 2 * D19 + (D13 - D12) / 2)))
Strips per sheet	5		= INT(D18 / (D14 + D19))
Segments per sheet	25		= D20 * D21
Total arc angle per sheet	750	degrees	= D22 * D3 / D4

④ **Crunching the numbers.** An Excel spreadsheet made it easy to calculate the required cutting dimensions. This can be re-created on any computer that has Microsoft Office software.



⑤ **Making the cuts.** The calculations in the Excel spreadsheet helped determine the number of panels that can be cut from a piece of plywood. The rip cuts were made on a table saw. Kellie Jaeger illustration

panels that you can get from a full sheet or leftover piece of plywood.

The engineering department also provided calculations in the Excel spreadsheet to determine the number of panels that can be obtained from a given piece of plywood if they're cut as shown in ⑤.

An easier solution

Designing the return loop on the CK&PR as a series of trapezoidal panels made its construction much simpler, since it could be fabricated in sections in the workshop and assembled in place. In addition, this method used smaller pieces of plywood and didn't require curved cuts or bending to assemble.

Using the Excel spreadsheet to determine the dimensions eliminated potential calculation errors and made it possible to ensure that the available piece of plywood was used efficiently.

If you plan on adding a loop to your model railroad, trying building it in segments. MR

Dave Bonser lives in Roberts Creek, B.C., with his family. He is an engineer with BC Hydro, an electric utility. This is his first byline in Model Railroader.

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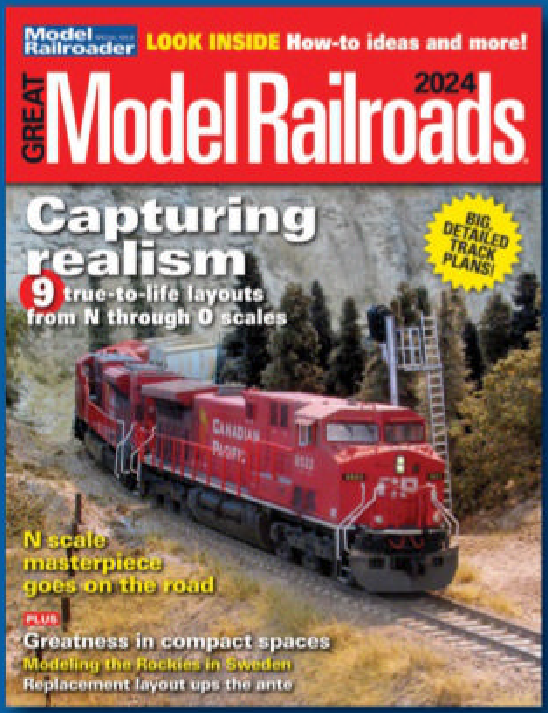
9 ALL-NEW LAYOUTS!



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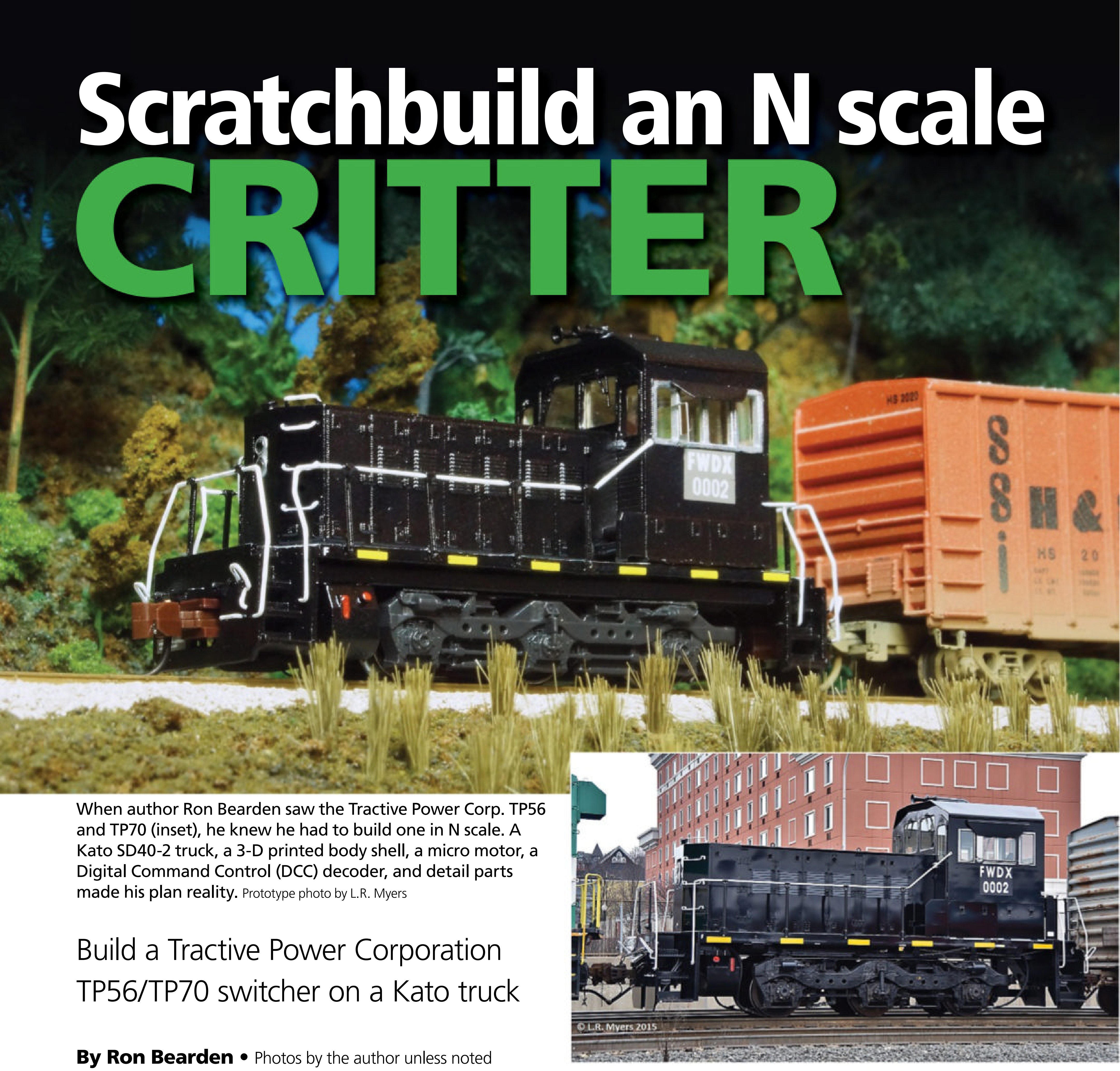


When author Ron Bearden saw the Tractive Power Corp. TP56 and TP70 (inset), he knew he had to build one in N scale. A Kato SD40-2 truck, a 3-D printed body shell, a micro motor, a Digital Command Control (DCC) decoder, and detail parts made his plan reality. Prototype photo by L.R. Myers

Build a Tractive Power Corporation TP56/TP70 switcher on a Kato truck

By Ron Bearden • Photos by the author unless noted

The history of creative locomotive rebuilds is long and storied. From the famous CF7s of the Santa Fe to the Uceta Shops GP16s to many modern iterations, railroads and companies have long looked for ways to reuse old parts.

Enter Tractive Power Corp. (TPC), an employee-owned company located in North Vancouver, British Columbia, Canada. TPC's solution to the rebuilding/recycling process is to build a switch engine directly on top of an EMD HT-C truck from retired SD40-2s. The traction motors are powered by an industrial (Caterpillar, Cummins, MTM, or John Deere) Tier 4 engine.

This idea isn't completely new to railroading. There are a number of small locomotives (often affectionately called "critters" by the railfan community) built on locomotive trucks. Milwaukee Road built a unique electric switcher from an old two-axle Baldwin truck. Conrail also used a cabless hostler built on an old EMD Blomberg truck.

What makes the Tractive Power Corp. switcher a bit unique is that it is designed for true switching duties and even short line work, not just hostling around a shop or turntable.

When I first came across these locomotives, I knew I had to build one. Though my model is N scale, modelers in other scales should be able to readily adapt my techniques. A 3-D printed HO scale shell is available from Shapeways.

History of the TPC critters

The TPC demonstrator locomotive, called TP56 (the "56" corresponding to

56,000 pounds tractive effort), was built in November 2013. The unit arrived for testing in the industrial setting of Parish & Heimbecker in Cloverdale, B.C., in May 2014. The company liked the unit so well it purchased it in December 2014.

The demonstrator TP56 has a 375hp Caterpillar C9 tier 3 engine. Visually, it has a few unique identifying features as compared to later units. There is no visible fuel tank, since it's located inside the engine compartment. Thus, the demo model is a bit shorter than successive versions. The lower windows on the back of the cab are smaller than the upper windows, and there are external collision posts on the rear wall of the cab near the steps. There are large lift rings and a drop step over the pilots and number boards on the rear. Lastly, the door arrangement is a bit different from other models. The road number is 5601.

With the success of the first unit, TPC purchased an old Canadian Pacific SD40-2, which was used to make two almost identical switchers, though they are different from the demo. These were a bit longer in order to move the fuel tank from inside the engine compartment to under the frame, just forward of the truck. The large lift rings on the pilots are gone; there are jacking pads on the side instead. As built, the new units lack ditch lights and number boards.

The first to be completed (in December 2015) was the TP70, a heavier switcher with a 475 hp Tier 3 Cat 9.3 engine that delivered 70,000 pounds of tractive effort (see the inset photo on the previous page). The primary distinction between it and the TP56 is a recessed headlight in the nose. The unit was painted black and numbered 0002 for FWDX (Tractive Power Corp. lease).

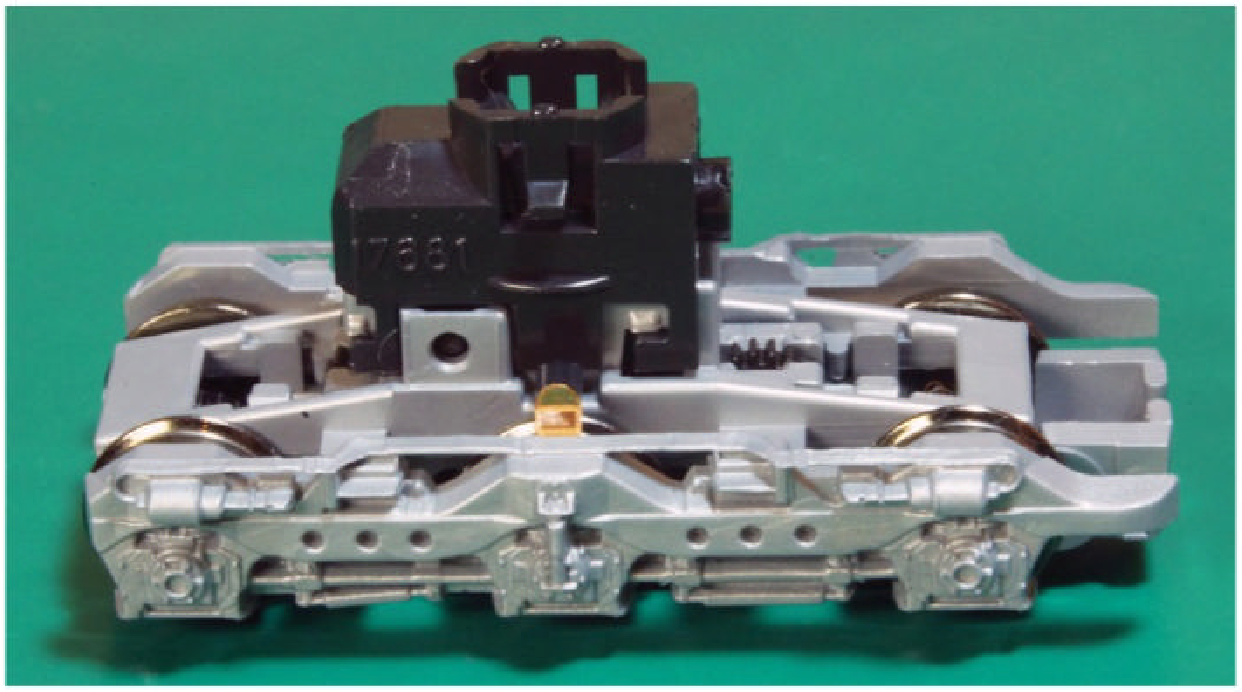
By the way, there's no exhaust stack; the exhaust comes through the screen just behind the sand hatch on the nose.

The second to be completed was a TP56 with 56,000 pounds of tractive effort. It has a 400 hp Tier 4 Cat 9.3 engine. It was painted bright green with a silver truck, numbered FWDX 0003, and leased to Curry Rail Services in Hollidaysburg, Pa.

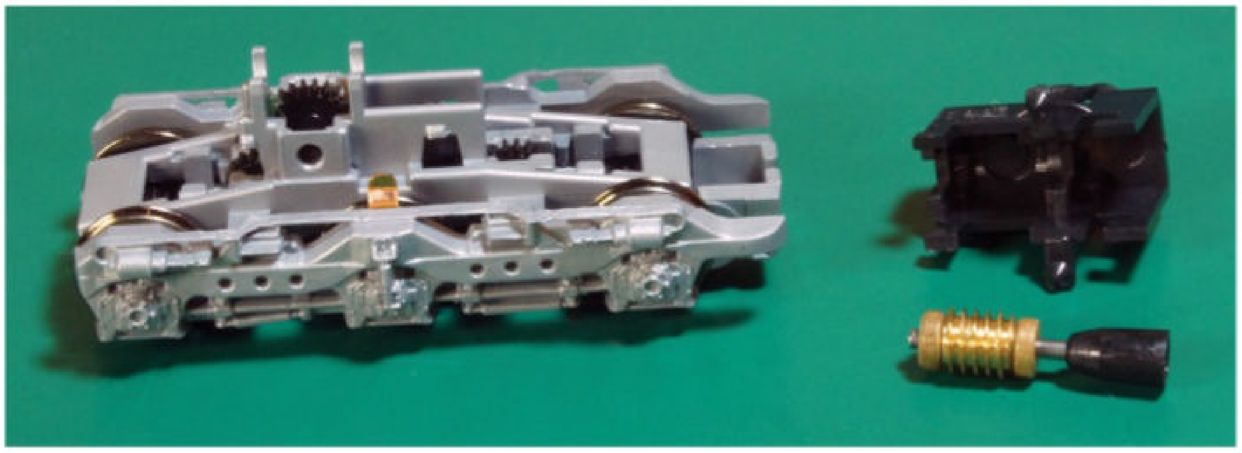
At the time of this writing, these were the only three Tractive Power Corp switchers. However, TPC had plans to build more.

Preparing the mechanism

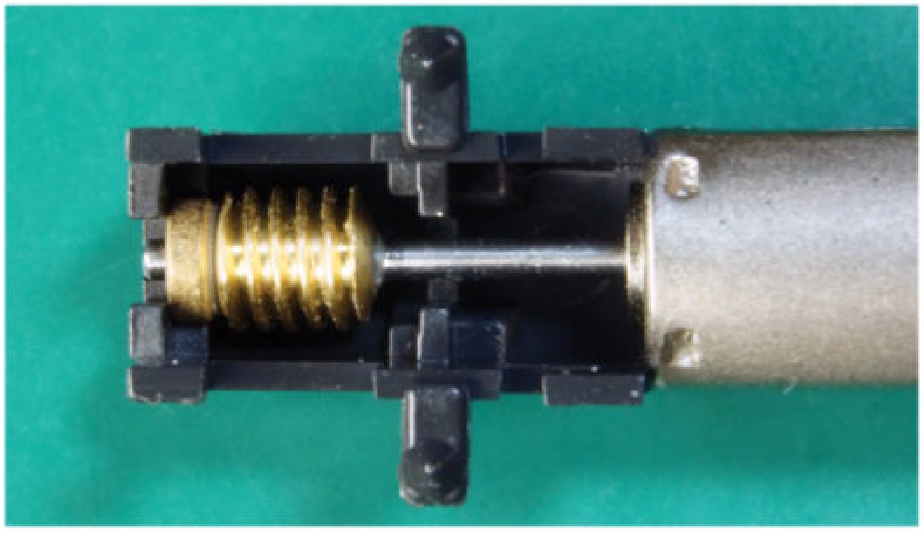
The first step was finding an N scale truck with the worm gear built into the truck. If the gear tower is offset to one



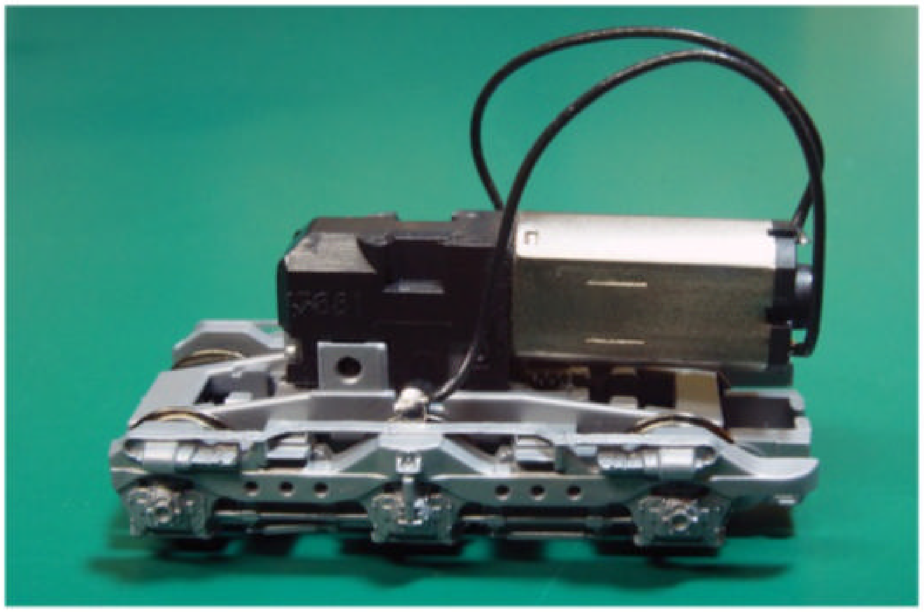
① The most vital component of Ron's build was a six-axle mid-production SD40-2 truck made by Kato. The truck had its worm gear built into the truck, rather than in the locomotive frame.



② Ron removed the gear tower enclosure and the worm gear. He trimmed the plastic gear housing to make room for the motor and DCC decoder.

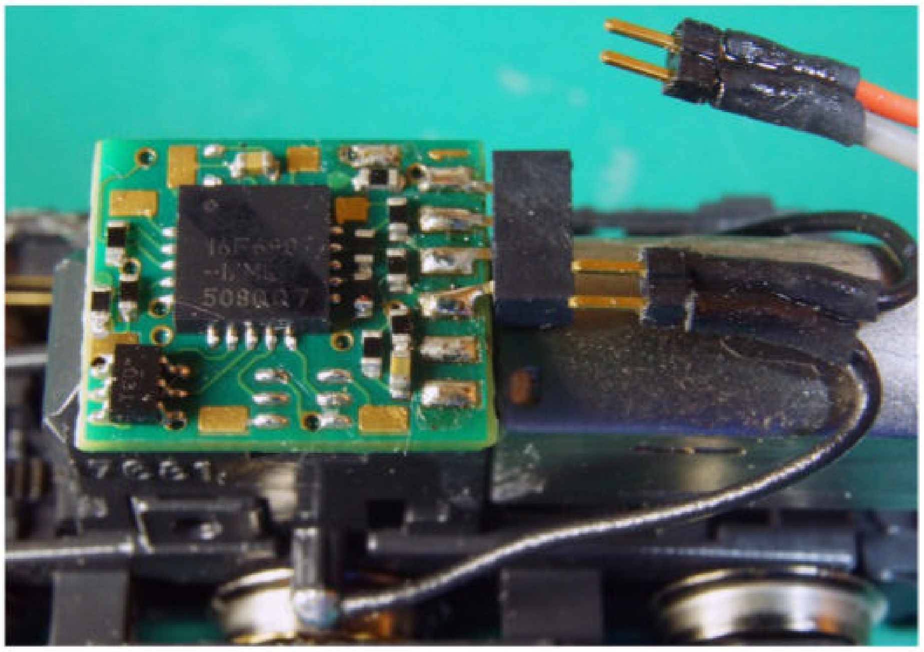


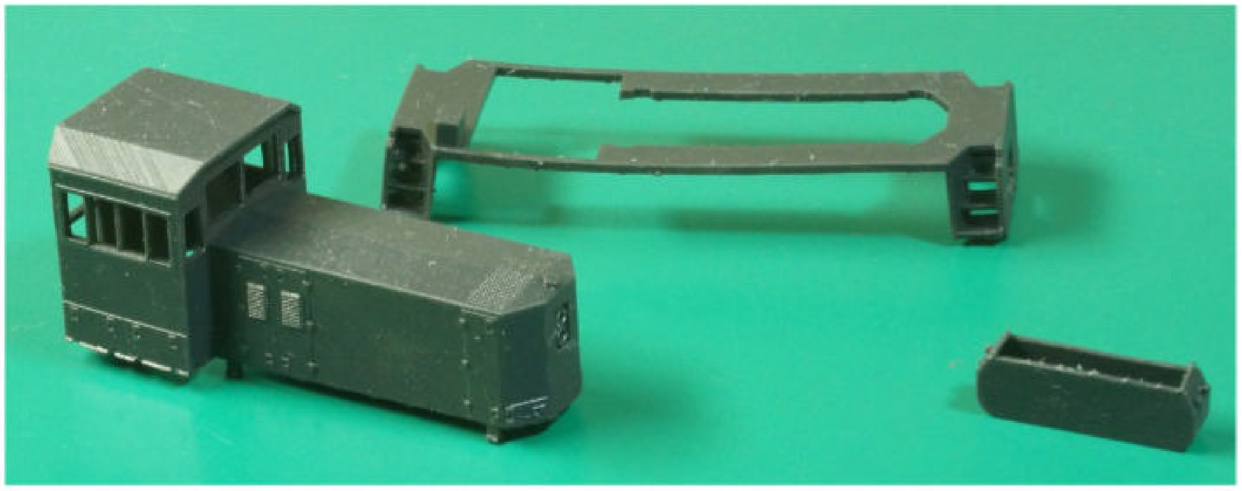
③ Conveniently, the motor Ron found on eBay was the same width as the gear tower enclosure and had a shaft long enough for both the worm gear and its end bearing.



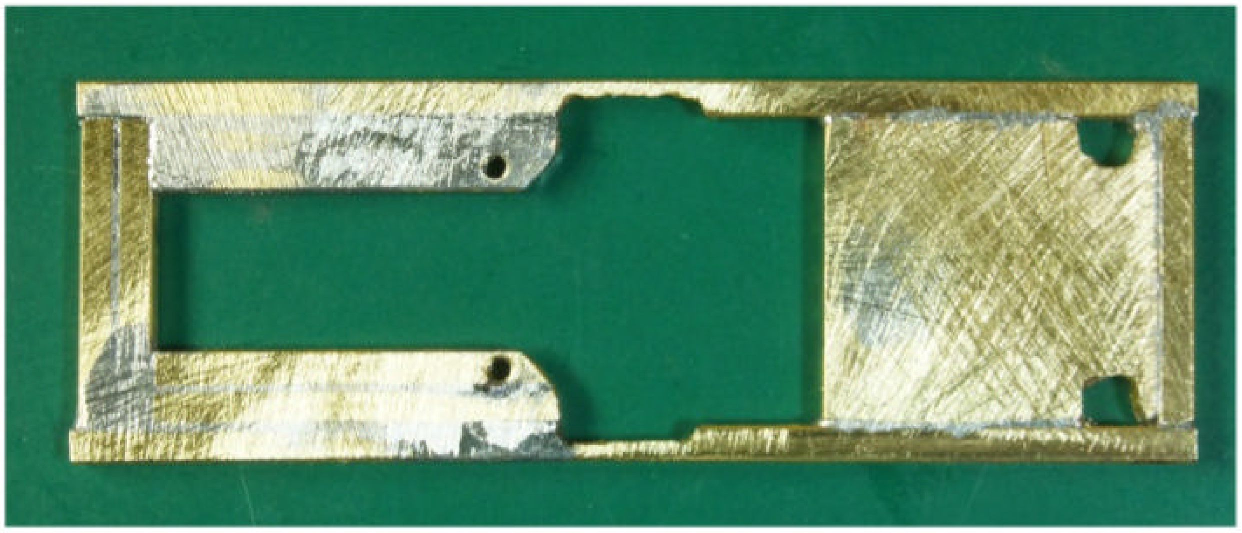
④ After mounting the motor and worm gear to the truck, Ron hooked up the motor leads to the truck's power pickups and tested it with a DC power pack. It ran.

⑤ Ron equipped the model with a Digitrax Z scale DCC decoder. He removed the decoder's insulation and wires before gluing it to the gear tower.

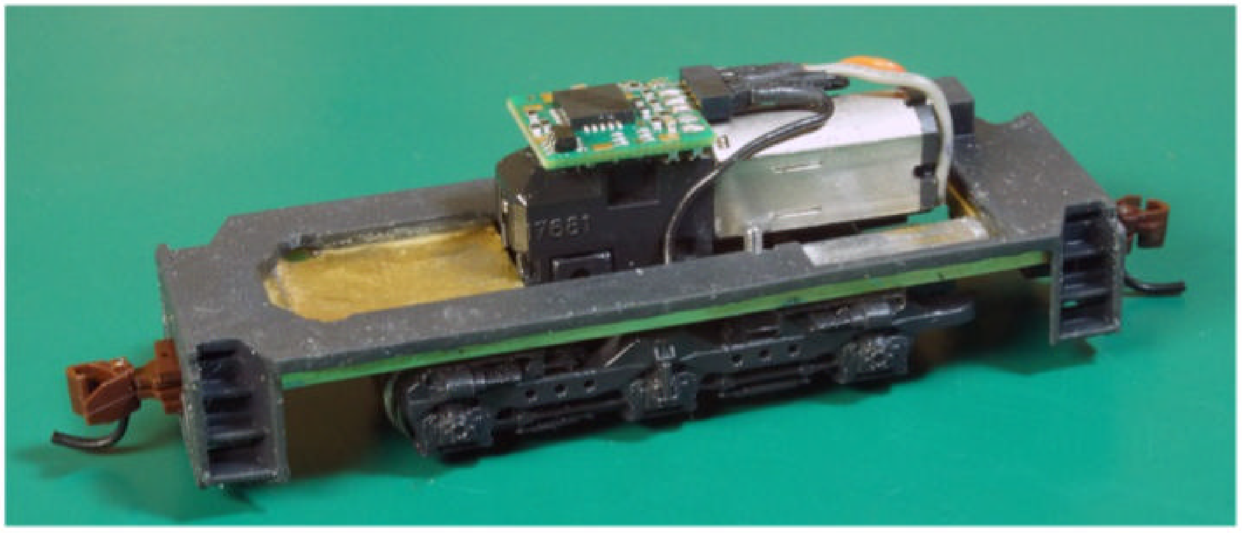




⑥ Ron found a vendor on Shapeways, the 3-D printing website, which offered a shell, sill, and fuel tank for the TPC TP56. He had the parts printed in black plastic.



⑦ Ron fabricated a sturdy frame for the locomotive from brass sheet, strip, and 1⁄32" tubing.



⑧ Ron used CA to glue the frame to the 3-D printed locomotive sill, to which couplers have also been added. Now that the motor is also wired to the decoder, the locomotive can be tested with DCC.

side, then that's a plus, since it allows extra room for the motor.

I used an HT-C truck from a mid-production Kato SD40-2 locomotive ①, previous page. It's the only Kato HT-C truck in N scale I could find with the worm attached to the truck. The worm is finer (thus geared lower) than other Kato HT-C trucks and uses a 1mm shaft.

Searching eBay, I found an ideal motor from a seller in Asia. The K20 micro motor is described as 9,500 to 18,000 rpm at 1.5 to 6 volts DC. It uses a 1mm shaft that's long enough to replace the worm shaft. The motor was the exact width of the truck gear tower, so I could mount it directly to the truck.

I removed the worm cover from the truck, setting aside the worm assembly ②. I then cut off the excess plastic from the top of the cover so that the top was perfectly flat. I also trimmed off the circular projections from the sides.

I used a NorthWest Short Line puller to remove the shaft from the worm. I had to ream out the hole of the worm so that it could be press-fit onto the motor shaft, because the shaft terminates up against plastic inside the motor on the commutator end. Tapping on the worm to seat it would damage the plastic housing, so press-fitting was the way to go.

I only used the outboard bearing on the shaft in order to reduce friction and allow for greater flexibility in motor placement. Looking inside the gear tower cover, there's a slot for the bearing. I positioned the motor up tight to the cover and made sure the bearing was in its slot. I lined up the sides of the motor with the gear tower cover and fixed the motor to the cover with cyanoacrylate adhesive (CA) ③. When the adhesive was cured, I made sure the worm had just a tiny bit of play and was not so tight against the bearing that it would bind. I then removed the motor with the cover attached and secured the worm with CA.

I attached the motor and worm assembly to the truck, soldered the motor leads to the power pickups ④, and tested it with a direct-current power pack. Though it didn't run well because of poor wheel-rail contact, it did when I applied weight to it, so I was satisfied enough to go on to the next step.

Because the motor was rated at 6 volts, I felt I could have better control and protection of the motor with DCC, so the next step was to install a Digitrax DZ-126 decoder. I chose this decoder because of its small size, but more importantly because its wire placement lends itself to modification.

I removed the protective insulation from the decoder (note: this almost certainly voids the manufacturer's warranty) and then used my soldering iron with a fine tip to remove the wires. I then glued the decoder to the worm cover ⑤, opposite. Since the day may come that the locomotive needs maintenance, I wanted to build it so it could be disassembled. I therefore installed a micro socket from TCS onto the decoder.

I mounted a 4-pin micro-socket on pads 1-4 of the decoder. This covers the orange, gray, red, and black wires (in that order; Digitrax placed a 1 at the orange pad). I had to spread out the 4-pin TCS socket pins a bit, but not much. I then used TCS 2-pin micro-plugs for the orange/gray wires and black/red wires.

Frame, shell, and weights

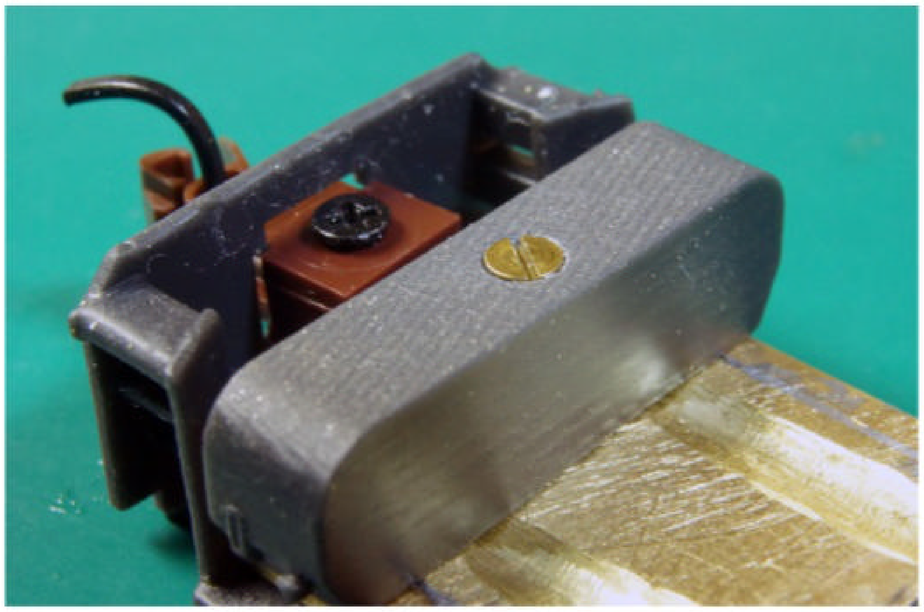
Next, David Cutting of Wasatch Scale Models stepped up to the plate. He drew and made available the shell, walkway, and fuel tank for a TP56/70 at Shapeways. These 3-D printed parts are currently available in N and HO scales at David's Shapeways page at shapeways.com/product/4WF4SUJE2, shapeways.com/product/37URPWYY6, and shapeways.com/product/GZYGVH9AP.

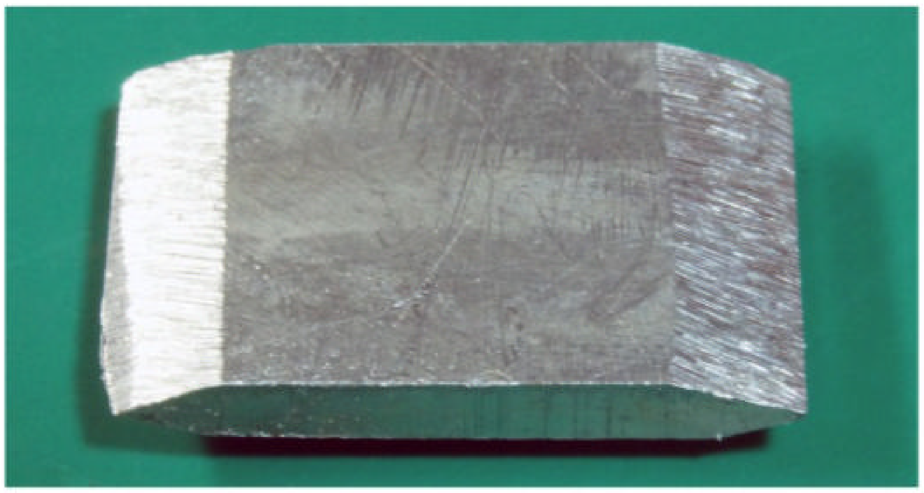
I placed an order to have the parts printed in high definition black acrylate (HDBA), which is more flexible than FUD (Frosted Extra Detail) and thus less brittle ⑥. The shell required a bit of clean up with a hobby knife. The printing was not completely smooth but was good enough. 3-D printing technology is only getting better with time.

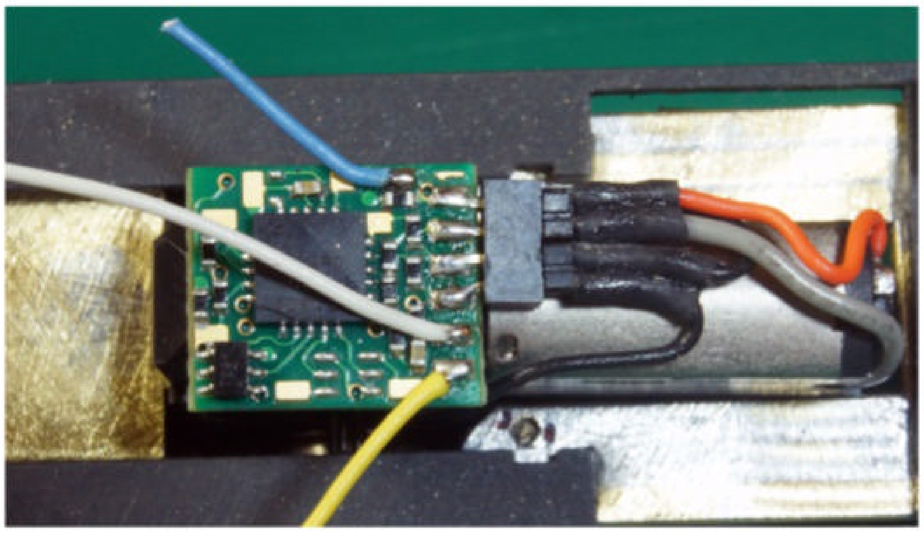
I then made a frame for the locomotive. In my first attempt, I started with 1⁄32" brass tubing. I then soldered brass pieces together for added weight and rigidity ⑦. The long notch on the left is for the motor. The large section in the middle is for the decoder. The notches on the right are for the locking tabs on the body shell. The thin portion is so that the electrical pickup will not touch the frame and cause a short. If I were starting over, I'd mill it all from one piece of brass.

I used CA to glue this frame directly to the walkway, giving the walkway added rigidity. I was then able to secure the walkway to the truck by running 00-90 screws through central support braces on the Kato truck ⑧.

I crafted a lead weight for the inside of the fuel tank casting to both add weight to the model and to add rigidity to the tank. This then allowed me to drill a hole through the tank and weight and secure the tank to the frame with a long 00-90 flathead screw ⑨.


⑨ The fuel tank is attached under the front of the frame with a single screw. A weight hidden inside the tank not only improves traction, but also keeps the screw from distorting the acrylate part.


⑩ To further increase the engine's mass, Ron carved weights from a lead tire weight. This one is shaped to fit in the cab's roof. Follow all safety precautions when working with lead, as it is toxic.


⑪ Ron soldered short wire leads to the function output pads on the decoder to power the locomotive's headlight.

The Kato wheels are low profile and probably safely cleared the frame, but just to be sure, I cut grooves in the frame to add extra distance and prevent shorts.

I then fashioned four weights from lead tire weights. (Note: Lead is toxic; wash your hands after working with it.) The largest went in the nose in front of the gear tower. I cut a groove in the weight for the fiber optics for the headlight. Two more weights fit in the cab. I decided that with the large windows in the cab, I would bring the weights up to the floor of the cab and leave the cab open. The third weight was filed to fit into the top of the cab under the roof ⑩.

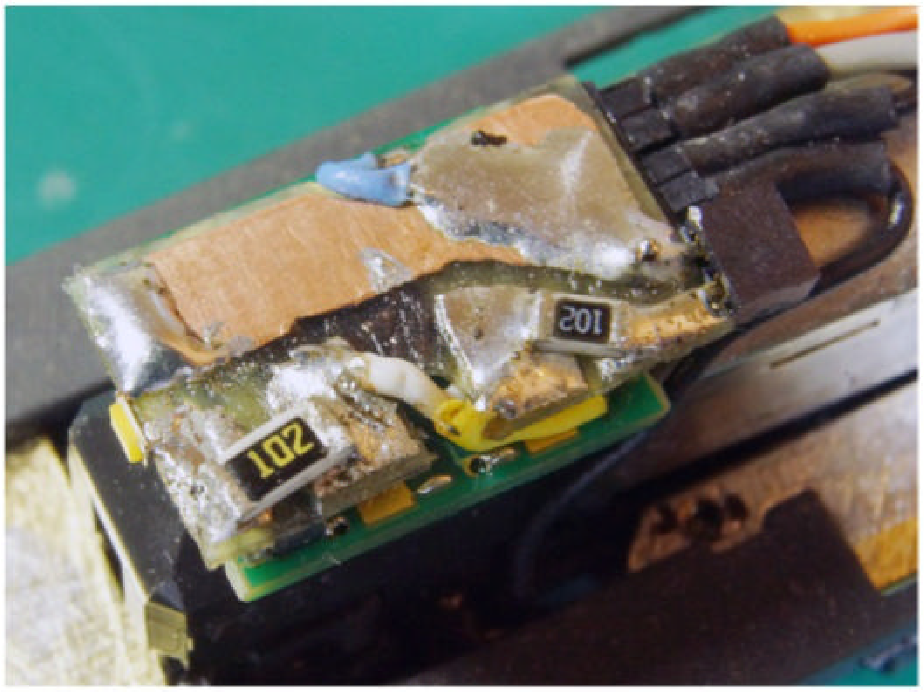
At this point, with all the extra weight, I had a smooth-operating switcher. I was sure to lower the value of Configuration Variable 5 (max voltage) in order to protect the motor.

Wiring and details

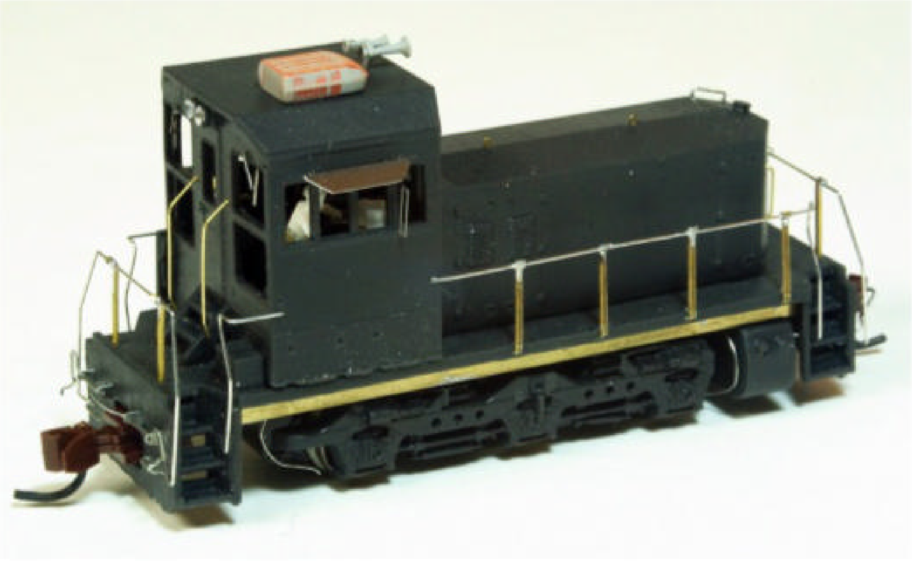
With a locomotive that now ran well, I was ready to move to lighting. Since there was still a bit of room between the decoder and the inside roof of the shell, I made a thin LED circuit board to lay on top of the decoder.

First, I soldered jumper wires from the lighting pads on the decoder ⑪. The blue wire is the pad that stands off by itself near pad 1. The yellow is the last pad, and the white next to last. I used the traditional colors for my jumper wires.

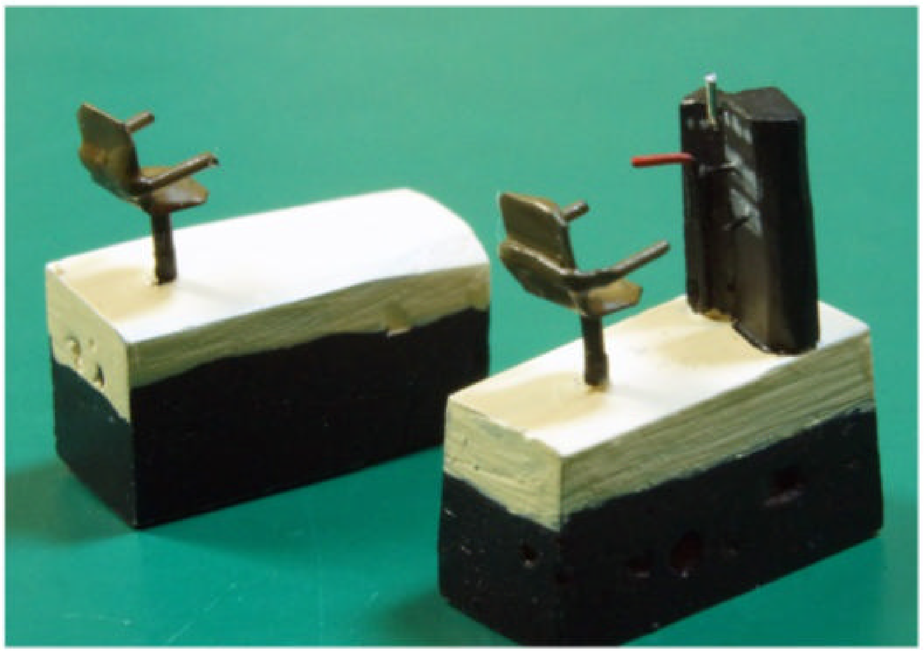
I then created my own little circuit board out of very thin copper coated board ⑫, next page. I used a motor tool to cut the traces. I then soldered the



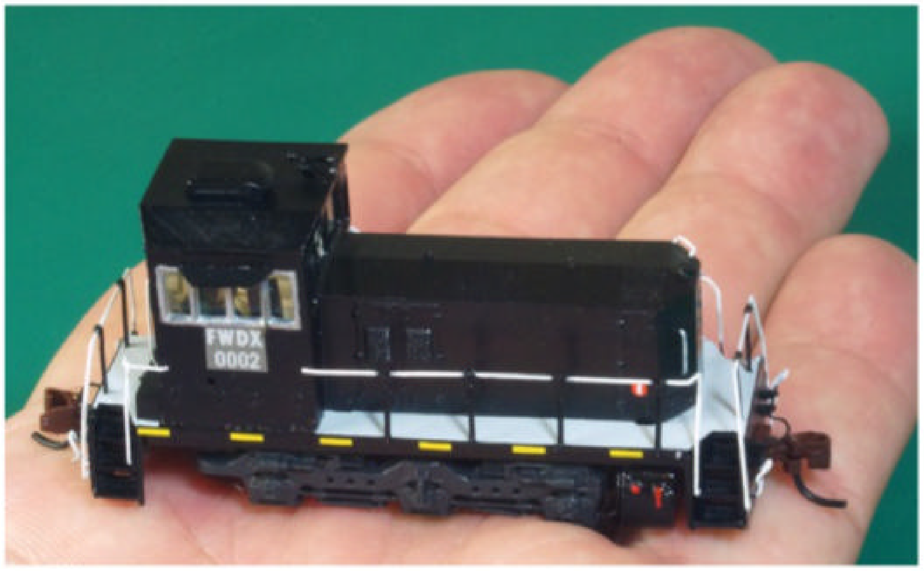
⑫ Ron made a custom circuit board to fit atop the decoder that would hold the light-emitting diode and its resistors, and soldered on the leads from the decoder. The LED is at the front of the board (left).



⑬ Superdetailing brings the little locomotive to life. The handrails are .010" guitar string with Gold Medal Models stanchions. Other details are from BLMA, Kato, and Atlas.



⑭ Since the windows of the locomotive showed so much of the cab interior, Ron added seats and a control stand. The seats are made of brass and the control stand from styrene with wire handles.



⑮ Ron painted the cab and body shell black and the walkways light gray. The decals were custom made by his friend Pete Wisniewski. With window glazing added, the little engine was ready for service.

jumper wires, resistors, and a micro LED for the front headlight. On the back portion, I soldered a 2-pin micro-socket from TCS. This socket would allow the shell to be removed, which was important since the rear light would be mounted permanently in the cab roof.

I then detailed the locomotive ⑬. I used Gold Medal Models stanchions and .010" guitar strings for the handrails. Gold Medal also provided the sunshades. The sanding hoses are .008" guitar strings soldered to the frame.

The lift rings, uncoupling levers, windshield wipers, and mirrors are by BLMA. The air conditioner unit is from a Kato F40PH and the horn is from Atlas.

Since the cab is so open, I created an interior by adding seats and a control stand to the cab weights ⑭.

I then painted the TP70. The shell pieces were all painted black. I painted the top of the walkway light gray. The interior was painted tan. The paint was completed with accents of white, silver, and red as needed. I added .30mm hobby fiber optics for the headlights.

For lettering, I was about to simply apply the block letters one at a time, but fellow modeler Pete Wisniewski provided me with custom decals. I then completed the model with a clear coat and added acetate windows ⑮.

A one-of-a-kind model

This compact three-axle N scale switcher weighs in at 41 grams, which is as much as some four-axle N scale locomotives. Overall performance is smooth. It won't creep tie to tie, since the motor is a bit underpowered, but once moving it performs beautifully.

My TP70 will comfortably pull about seven or eight 50-foot boxcars. I found pushing it to its limit of about nine cars with continuous running causes the motor to get warm. However, it can switch cuts of five to seven cars wonderfully all day long.

This was a rewarding modeling experience – not only in producing a model of a unique prototype, but also in creating it in the collaboration of a modeling community. MR

Ron Bearden is a pastor and CSX fan who lives with his wife, Melanie, in Milton, Fla. He is an accomplished author with more than 100 articles published in the hobby press, but this is his first byline in Model Railroader. *In addition to railroads, he enjoys ventriloquism, hunting, and billiards.*

TractivePower
CORPORATION

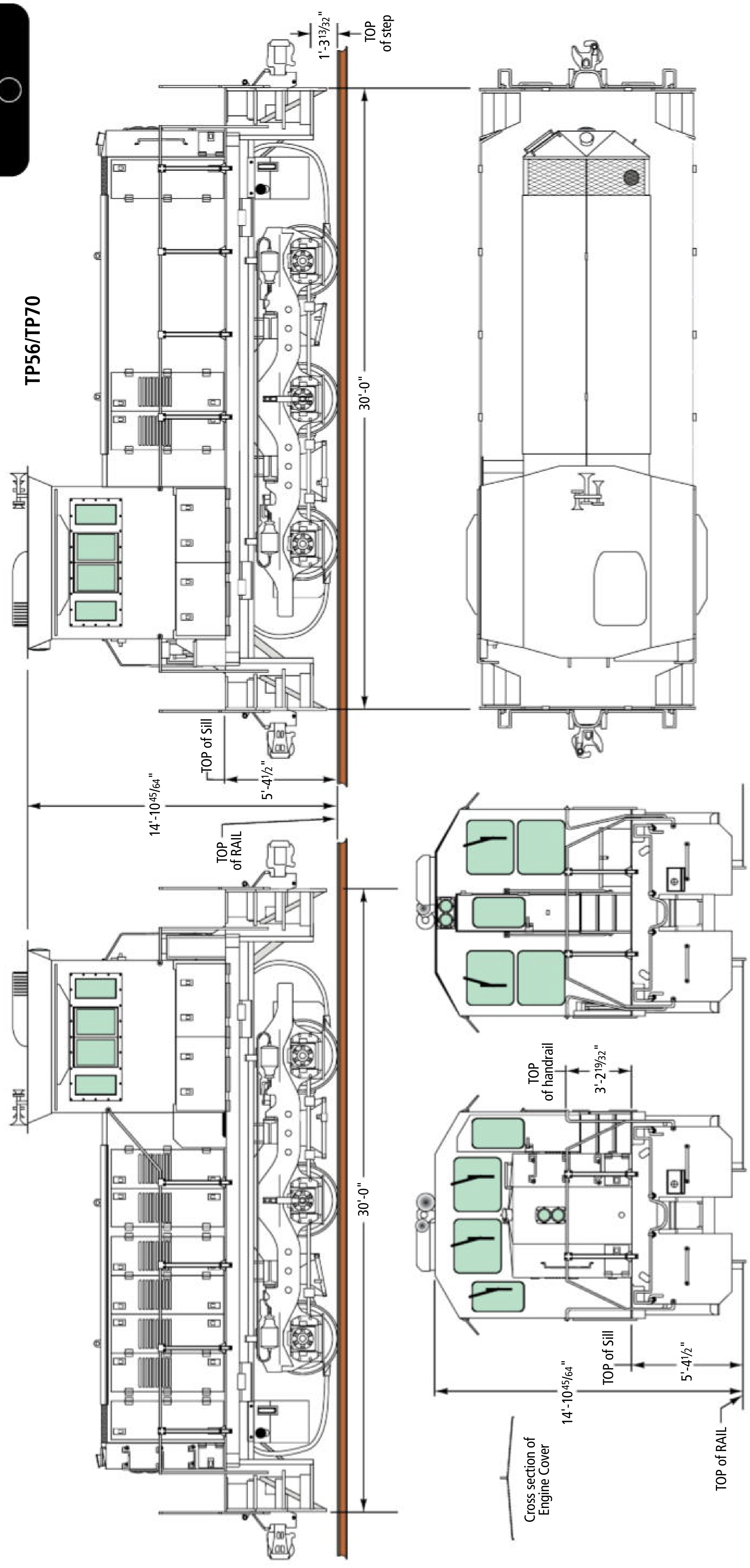
Ratio 1:87.1, HO scale

TO CONVERT HO SCALE
DRAWINGS TO YOUR SCALE
COPY AT THESE PERCENTAGES:
N 54.4 percent S 136.1 percent O 181.4 percent

Illustration by Ron Bearden,
drawn with permission from TPC documents

NOW ON TRAINS.COM
Subscribers to our website can download and print these drawings from Trains.com

TP56/TP70


1'-3 13/32"
TOP of step
30'-0"
14'-10 45/64"
TOP of Sill
5'-4 1/2"
TOP of RAIL
30'-0"
TOP of handrail
3'-2 19/32"
14'-10 45/64"
TOP of Sill
5'-4 1/2"
TOP of RAIL
Cross section of Engine Cover

Materials list

Atlas Model Railroad Co.
497204 Air horn

BLMA (now Atlas)
BLMA-13 Uncoupling lever
BLMA-60 Drop grab irons
BLMA-90 Lift rings
BLMA-96 Windshield wipers

Circuitron
800-8030 30 mil fiber-optic

Digitrax
DZ-126 DCC decoder

Gold Medal Models
160-7 Sunshades and mirrors
160-32 Stanchions

Kato
921572 F40PH air conditioner
929211 HT-C truck

Shapeways.com
4WF4SIK3E2 TP56 body shell, N scale
37URPWYY6 TP56 sill, N scale
GZYGVH9AP TP56 fuel tank, N scale

Miscellaneous
Micro-Trains couplers
Evergreen clear styrene window glazing
Custom decals
Guitar string
Brass sheet, strip, and tubing
Various paints and glues

Your first decoder installation

SCL/LN
FAMILY LINES SYSTEM
GA
6051

① This month, Allan Gartner guides a friend through his first decoder installation, adding a SoundTraxx Blunami in an Atlas Trainman HO scale Electro-Motive Division GP38-2.

My friend, Keith, has a layout with Digital Command Control (DCC) but he's never installed a decoder before. He really liked what I'd written about the SoundTraxx Blunami in my December 2022 column and wanted to install one in his favorite locomotive to run on his layout. Keith also wanted to take it to our club's layout. This column will focus on how we handled the installation.

Keith installed the Blunami in an HO scale Atlas Trainmaster Electro-Motive Division GP38-2 diesel locomotive ①. It came with a QSI sound decoder and two speakers. He removed the QSI decoder and confirmed the Blunami would fit in the space. If you're adding speakers, make sure they fit in a baffle and the assembly fits in the locomotive. He bought a SoundTraxx Current Keeper, but due to the low front hood, we decided there wasn't enough room for it.

When installing a new decoder, make sure the motor leads are isolated from the frame and the pickup leads. Since this locomotive had a QSI decoder in it, we knew the motor was already isolated. Locomotives that are "DCC-ready" also have the motor leads isolated. In all other cases, use your digital multimeter on ohms or continuity to verify that neither motor lead is connected to the frame or either set of pickup wheels. Check this before you fry your decoder!

The printing on the two speakers is unclear in this locomotive, so it's difficult to tell if they are 2W speakers or 0.2W speakers. They're very thin, so I doubted that they were 2W speakers. We determined they're 8Ω speakers.

.3 .2 .12
.4 1.25 .16 mm Ø
26 28 30 32 34 36 AWG
0,4 0,3 0,25 0,2 0,16 0,12 mm
molex

② The Molex wire stripper is available from Digi-Key (digikey.com) as item number WM22685-ND. The wire size selector has detents, making it easy to set and stay set.

The locomotive has a light-emitting diode (LED) headlight on a small printed-circuit (PC) board and a rear light that's mounted to the frame on a another small PC board. Wires wouldn't need to be run to the shell.

Identify the current wiring before removing any existing electronics. Expect identification of wires to take some time. The Atlas model had red and black wires leading to the front and rear trucks. The QSI decoder had connectors, but they were tight and we couldn't remove them. Since they weren't needed for the Blunami, Keith cut the wires at the decoder.

We found four wires for the motor, two to the motor and two to filter capacitors. The capacitors are typical of locomotives sold in Europe. He removed the capacitors. Only the two wires going to the motor would be used.

Next, we identified the speaker wires. The headlight was slightly harder to identify, as it was different than expected. It's a small surface-mount (SMD) LED on a small, vertically-mounted circuit board.

SMDs don't look like a typical LED. This one was yellow, as seen on some LED lights. There were a few other components on the board that I was unable to identify.

The board had red and black wires. Not wanting to damage any components, I put a 1,000 (1k)Ω resistor in series with the positive end of a 9V battery. Hoping that the red and black wires were indicative of the polarity of what I thought was an LED, I connected the negative end of the battery to the black wire. I touched the other end of the resistor to the red wire, and the LED turned on.

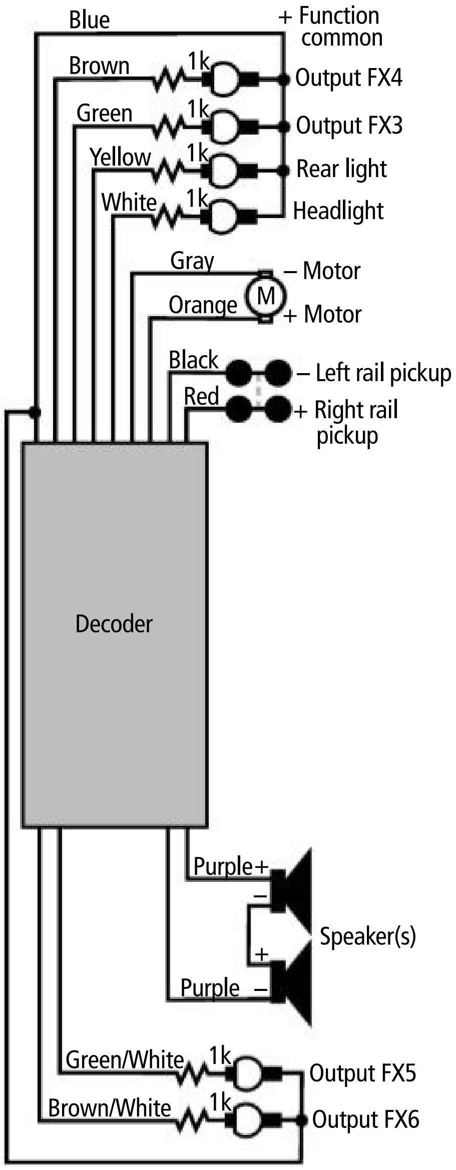
The rear light was definitely an LED, but it was on a circuit board that had four wires and two capacitors. I tried my makeshift 9V-and-resistor tester on the two black wires because they were closest to the LED. Initially, it didn't work. So I swapped the black wires, and the LED lit. Keith now had everything identified that he would need. He wouldn't need the other two wires going to the rear lighting board.

Now the installation could get underway. You'll need a way to strip small diameter wires. I prefer my thermal wire stripper (available online) as it doesn't put strain on the wire you're stripping. Use it in a well-ventilated area and keep a fan handy to blow the smoke away from you. If you prefer a less expensive stripper, I suggest the Molex from Digi-Key ②.

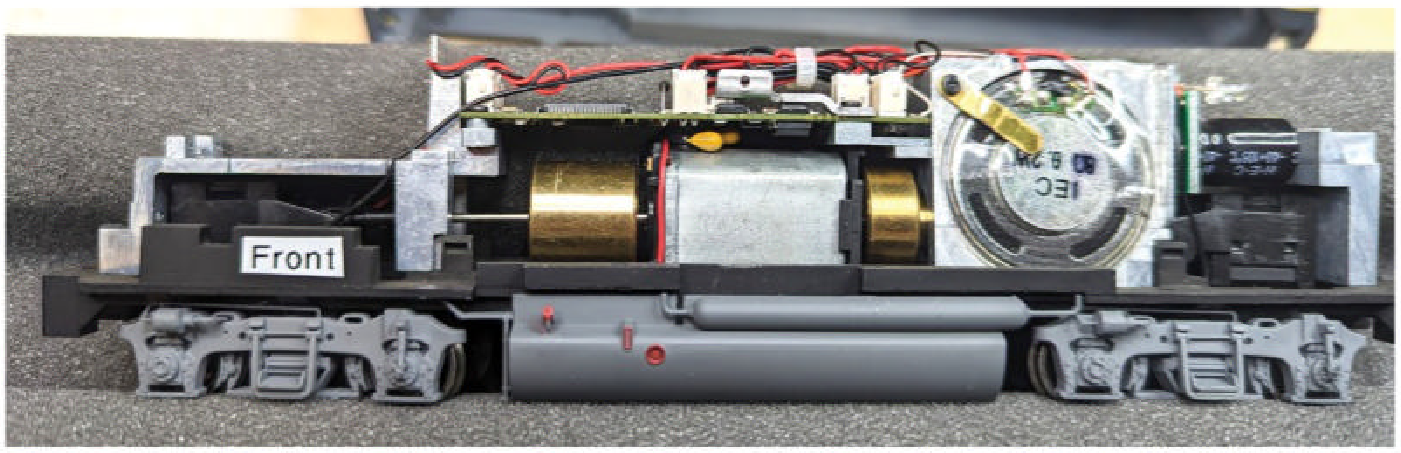
You'll also need some heat-shrink tubing in a variety of sizes. For a decoder, 1⁄16" to 3⁄16" are good sizes to keep on hand. SoundTraxx (soundtraxx.com) and NCE (ncedcc.com) sell heat-shrink tubing, as do electronics distributors like All Electronics (allelectronics.com).

The wires on your decoder are probably longer than you need. Working with short wires is challenging, but you need to make them as short as you can handle. Excess wire folded up inside the locomotive takes up valuable real estate.

First, attach the leads from the pickups ③. Sometimes the wires in a locomotive are all one color, usually black. Make sure you know which wires go to the right and left sides. In this case, the wires were red and black. National Model Railroad Association



③ Here's a wiring diagram for SoundTraxx Blunami and Tsunami decoders. The wire colors coming out the top are National Model Railroad Association standards. Note that the long lead of a typical LED goes to the blue function common lead.



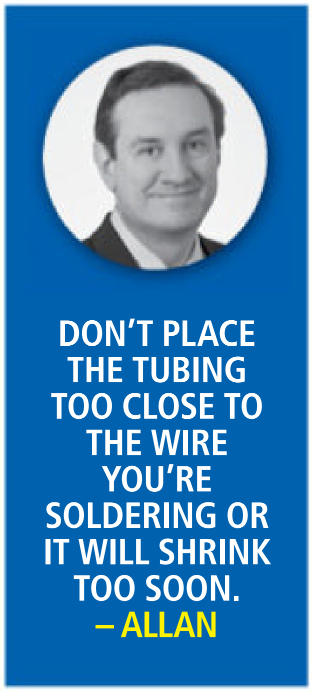
④ Here's what Keith's HO scale GP38-2 looked like straight from the box. There are two speakers, one on each side, firing into a baffle. The QSI decoder spans the motor.

(NMRA) standard S-9.1.1 requires red and black wires to be used for power pickups. The red wire from the decoder goes to the right-side pickups. Next do the left side. You may find that the wires from the trucks are too short and will not reach from the front and rear truck. You may need to add some wire (the wire cut from the decoder will work just fine).

When using heat-shrink tubing, you often have to slide it onto the wire before soldering. Don't place the tubing too close to the wire you're soldering or it will shrink too soon. Try to have the heat shrink as far away from the soldering iron as you can. A good 1½ to 2 inches away is a required minimum. Use a small heat gun from Micro-Mark (micromark.com) or Hobby Lobby to shrink the heat-shrink tubing.

I always recommend doing an incremental installation and test as you go along. If you are installing a Tsunami or Blunami, SoundTraxx has provided a blue LED that's visible through the shrink wrap around the decoder. You can use any decoder you want, but if you have a SoundTraxx decoder, put your locomotive on the track and see if the LED glows.

The orange and gray wires go to the motor. Often, you do not know which wire goes to which motor lead. Temporarily hook up the leads to the motor and test your locomotive on address 3 to verify that the locomotive goes forward when it's supposed to. If not, swap the motor wires. When you have it right, permanently solder the connections and test. Keith lucked out; when he attached the red wire on the motor to the orange decoder wire, the locomotive moved forward when he commanded it to do so.



DON'T PLACE THE TUBING TOO CLOSE TO THE WIRE YOU'RE SOLDERING OR IT WILL SHRINK TOO SOON.
– ALLAN

Due to our uncertainty of the power rating of the speakers, there was a problem. I gave him a 22Ω, ¼W resistor to put in series with the speakers to limit the maximum power. It worked well. We then wired them up and tested. If you're soldering to a speaker directly, be extremely careful. It's easy to melt the speaker housing. I suggest a 15W or 25W soldering iron. Tin the speaker lead to help things go fast when you solder to the speaker.

When soldering a wire to a lead on a resistor, wrap the wire around the lead to within ⅛" of the resistor. Solder it, cut off the excess lead, and slide a piece of your larger heat-shrink tubing over the resistor.

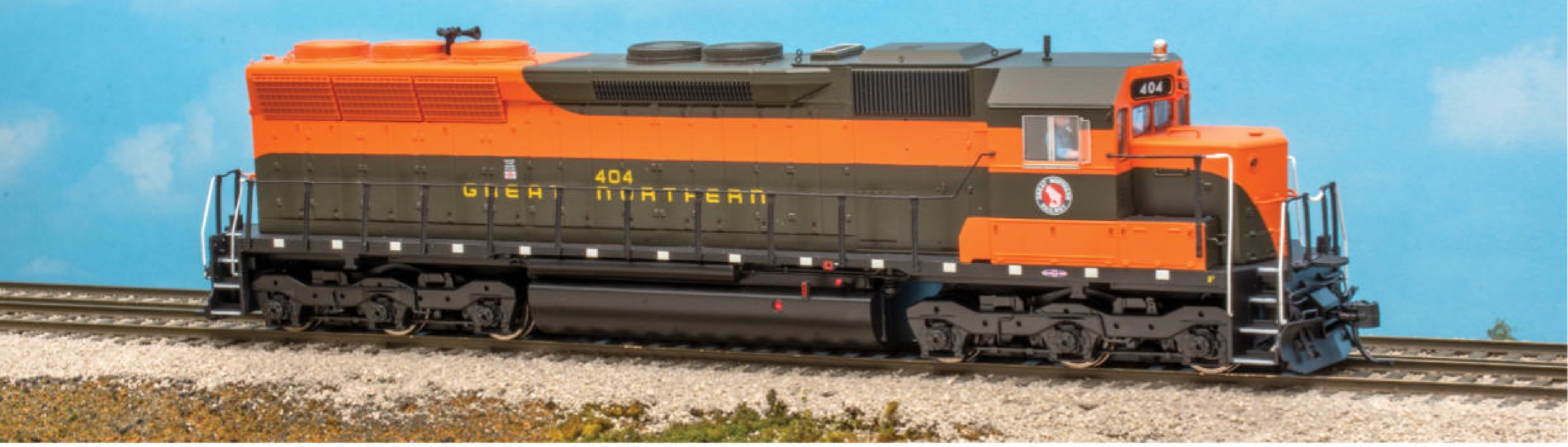
I've shown the wiring diagram for the SoundTraxx Blunami ③. Keith only needed the headlight and rear light. He didn't need outputs FX3 through FX6, but maybe you have a more ambitious project. The typical LED has a flat-sided rim and one lead is shorter than the other. I've shown these on the wiring diagram for your project.

The blue decoder lead is the positive common for all the functions. As you can see from the diagram, it may have many connections to it. Since they may not be all in the same part of the locomotive, you may have to have connections located throughout the locomotive. Think through your installation before starting. At the very least, the rear light will need a wire connecting it to the LEDs in the vicinity of the cab and the decoder.

Place a 1,000 (1k)Ω resistor in series with the front LED. Attach it to the white wire. Test it and solder. Don't forget the heat-shrink tubing. Test again. Move on to the rear LED. This time, the resistor connects to the yellow wire.

After getting the rear headlight working, Keith's project was almost done. Even though I warned him, and the decoder fit inside the locomotive, it was hard to get the wiring and resistors inside and get the shell on when he was done. He had to trim some plastic inside the shell to accomplish this.

Now program your locomotive's address using your DCC system's programming capability or use JMRI's DecoderPro. You'll have several options for CV 29. Key options are to disable running on DC unless you plan to use DC. Sometimes locomotives that don't have this disabled will take off like a bullet train on DCC. Be sure to select 28/128 speed steps and extended addressing if you plan a locomotive address that is 128 or higher. Enjoy your new locomotive!



WalthersProto HO scale EMD SD45

Wm. K. Walthers Inc. has released a new run of HO scale Electro-Motive Division SD45 diesel locomotives. The models, part of the WalthersProto line, feature railroad-specific details, light-emitting-diode headlights, and Proto-Max metal couplers.

Our sample is decorated as Great Northern 404, part of the railroad's 400 through 426 series. The locomotive was built by Electro-Motive Division under order number 7871 in May 1966.

The GN received its SD45s in three batches. Units 400 through 407 arrived in May and June 1966. The 408 through 417 were received in April and May 1967. The remaining locomotives, 418 through 426, came on the property in July and August 1968.

The GN SD45s delivered in 1966 were different from the rest of the fleet. The locomotives had a ratchet-style handbrake on the brakeman's side of the short hood and the air horn between the first and second radiator fans. The later units had a brake wheel on the engineer's side of the long hood and an air horn on top of the cab above the headlights.

Great Northern's SD45s became part of the Burlington Northern diesel fleet in March 1970. The 404 was renumbered 6434 on May 25, 1970. The locomotive was retired in April 1982.

The WalthersProto SD45 uses plastic and die-cast metal construction. Features on the body shell include lift rings, factory-installed and painted grab irons, and see-through radiator and dynamic brake fan screens. The three-chime air horn is accurately located between the first and second radiator fans. The air line running from the top of the hood to the base of the horn was a nice touch.

A firecracker antenna and working rotary beacon are on top of the cab. The details are correct for GN SD45s delivered in 1966. Two factory-painted crew figures are inside the cab.

The front and rear pilots have m.u. hoses, a trainline hose, uncoupling levers, drop steps, and an m.u. receptacle. The front pilot has a snow plow, and the rear pilot has footboards.

Our sample is painted in Great Northern's simplified Omaha Orange and Pullman Green scheme. The herald and lettering placement match prototype photos that I found online.

I compared the model to prototype drawings published in Reference Sheet No. 122 from the Great Northern Ry. Historical Society. The dimensions accurately follow published data.

The SD45 we received has a dual-mode ESU LokSound 5 sound decoder. I first tested the locomotive in direct current (DC) with an Athearn power pack. The sounds came on at 8V, and the model crawled along at 3 scale mph at 10.2V. The six-axle road locomotive achieved a top speed of 49 scale mph.

In DC mode the headlights, number boxes, and beacon are illuminated. The only sound effects are the engine startup sequence and the diesel engine.

I turned to an NCE Power Cab to do the Digital Command Control (DCC) testing. At step 2 the model moved at 2 scale mph. At step 28 the unit was rolling along at 64 scale mph. Great Northern's SD45s were used on long-haul freights between Minneapolis and Seattle and had a top speed of 83 mph. The speed range can be fine tuned with configuration variables.

I used the SD45 to pull a freight over the main on our Milwaukee, Racine & Troy layout. I also switched some cars on the Jones Island section. In both settings the unit performed without incident.

Electro-Motive Division produced more than 1,200 SD45s between 1965 and 1971. Thanks to Walthers, you can add the six-axle road unit to your HO scale fleet. – *Cody Grivno, senior editor*

Facts & features

Price: Direct current, $219.98; with dual-mode ESU LokSound 5 sound decoder, $319.98

Manufacturer

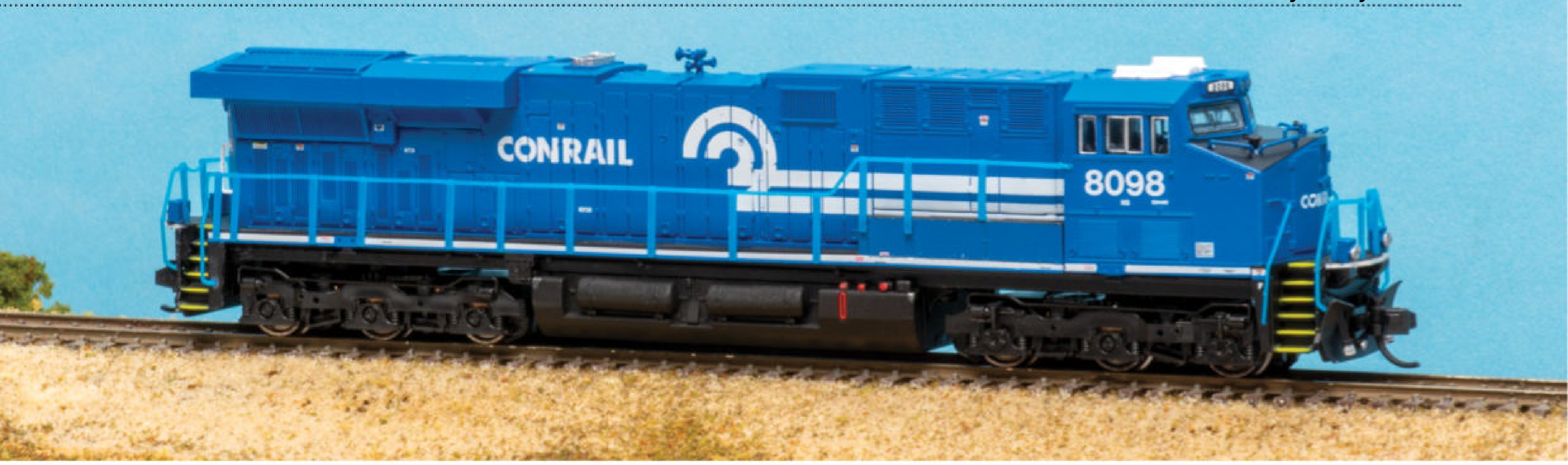
Wm. K. Walthers Inc.
5601 W. Florist Ave.
Milwaukee, WI 53218
walthers.com

Era: June 18, 1966 to May 25, 1970 (as decorated)

Road names: Great Northern (Omaha Orange and Pullman Green), Milwaukee Road (orange and black), Norfolk & Western (black and white, high short hood), Penn Central (black and white), Southern Ry. ("tuxedo" scheme, high short hood), and Wisconsin Central (maroon and gold). Four road numbers per scheme.

Features

- Proto-Max metal couplers
- Railroad-specific details
- Weight: 1 pound, 4.3 ounces



Broadway Limited Imports N scale ES44AC

If you spend a day railfanning a Class I railroad in North America, chances are pretty good you'll see an ES44AC diesel locomotive. The AC traction version of General Electric's 4,400 horsepower Evolution Series is one of the most common locomotives roaming the rails today. Broadway Limited Imports (BLI) offers the six-axle unit in multiple prototype and fantasy schemes.

General Electric began producing the ES44AC due to Environmental Protection Agency exhaust emission standards that would be imposed on locomotives manufactured after January 1, 2005. The ES44AC replaced the AC4400CW in GE's product catalog, and the company developed a new 12-cylinder "GEVO" diesel engine for the road locomotive. Even with four fewer cylinders, the engine still has the same 4,400 horsepower output as the AC4400CW while reducing exhaust emissions by 40 percent.

Though it's a new locomotive model, the ES44AC has virtually the same dimensions as the AC4400CW, with the radiator section having the most visible changes. Since 2003, around 5,000 ES44ACs have been produced.

The BLI ES44AC has an injection-molded plastic body with accurate radiator grill, panel line, and traction inverter box detail. The handrails, horn, bell, brake wheel, exhaust stack, and cab roof antenna are freestanding parts. The walkways and side steps have molded safety tread detail, and the step faces are picked in yellow. Cab sunshades and side-view mirrors weren't included on the model.

The front and rear pilots both have molded uncoupling levers, separately applied air hoses, and m.u. hoses. The front pilot features a plow. The Conrail heritage unit has ditch lights on the front and rear, but only the front set operates. The front pilot on our unit was angled slightly upward.

The six-axle steerable trucks are accurately detailed. The contemporary road unit has all-wheel drive and electrical pick-up.

In 2012, NS rolled out 20 units in the schemes of predecessor roads. ES44AC No. 8098 was painted Conrail Blue with the larger "can opener" herald on the hood. The unit was painted at the Juniata Locomotive Shop in Altoona, Penn., and went into service on March 15, 2012.

The paint on the Broadway Limited model closely follows the prototype and is evenly applied. The side handrails and stanchions are a lighter shade of blue, probably due to the type of plastic used. The vertical handrails for the front and rear steps are blue on the model, but they are white on the prototype.

The Paragon4-equipped locomotive has great control at both low and high speeds. The dual-mode Paragon4 decoder allows modelers to operate the locomotive in direct current (DC) and Digital Command Control (DCC).

In DC, the locomotive started moving at 6 scale mph at 9.5V. At 14.5V the locomotive's top speed was 92 scale mph.

In DCC mode, the road locomotive started moving at step 1 with a low speed of 3 scale mph. The top speed at step 28 was 106 scale mph, much higher than the prototype.

The unit's sound is crisp and the light-emitting diode lighting is accurate. The headlights are directional and the front ditch lights are operational. The cab interior light illuminates when the diesel is stopped and turns off when the locomotive starts moving.

This locomotive is a perfect fit for modern modelers or anyone wishing to add some color to their fleet. The ES44AC is a smooth runner and prototypically decorated and detailed. A Class I mainline isn't complete without a GEVO. – *Bryson Sleppy, associate editor*

Facts & features

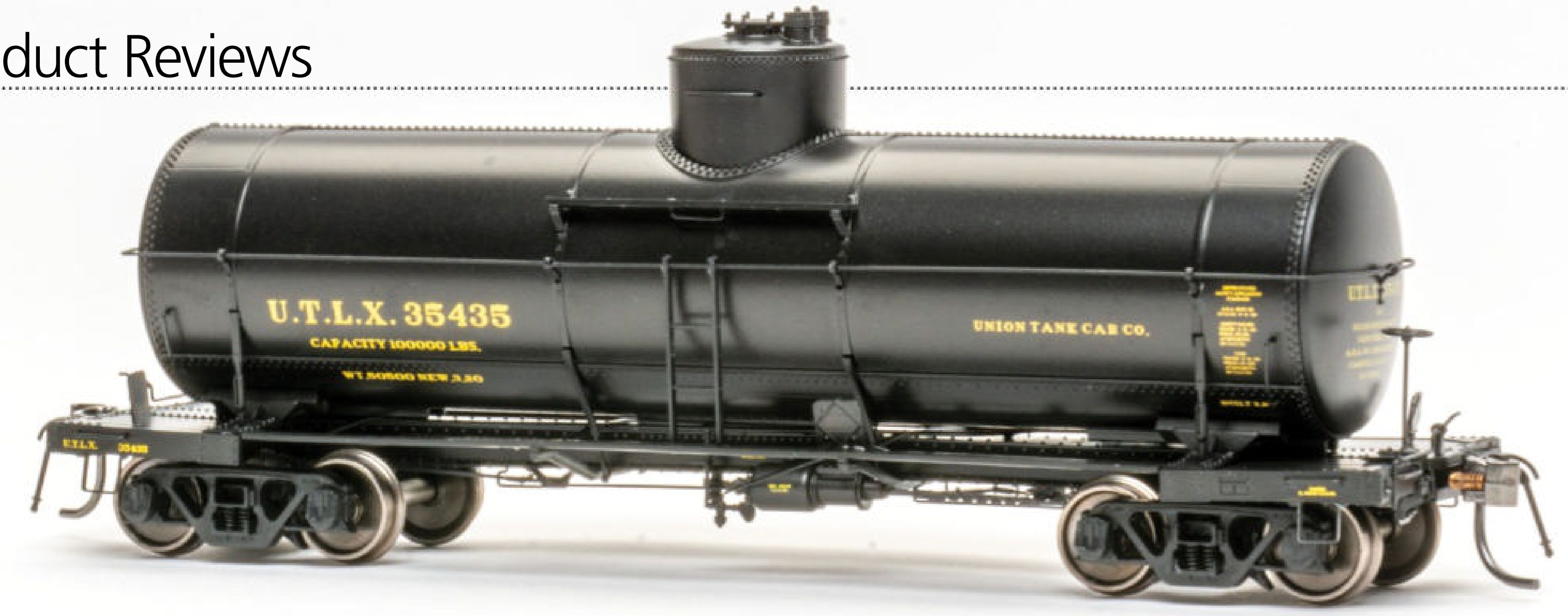
Price: $299.99

Manufacturer
Broadway Limited Imports
9 East Tower Circle
Ormond Beach, FL 32174
broadway-limited.com

Era: March 2012 to present (as decorated)

Road names: Norfolk Southern (Conrail, original NS, Pennsylvania RR, and Southern Ry. heritage units and Thoroughbred scheme), BNSF Ry. (Heritage III), CSX (Pride in Service schemes), GE demonstrator (blue), Kansas City Southern ("Safety Starts Here" scheme), and Union Pacific ("Building America" scheme). Fantasy schemes: Atchison, Topeka & Santa Fe (zebra stripes); Great Northern (orange and green); Canadian National (green and gold); and UP (two-tone gray).

Features
- All-wheel electrical pick-up
- Weight: 3.4 ounces



Rapido HO 10,000-gallon UTLX X3 tank car

A sharp-looking model of a ubiquitous tank car is the latest HO scale offering from Rapido Trains. The 10,000-gallon Union Tank Car Class X3 prowled the rails all across North America for more than 50 years. Rapido's injection-molded plastic version comes with meticulous brake detail, wire grab irons, metal knuckle couplers, and free-rolling blackened metal wheels. Since it's offered in multiple road names, some of those in multiple differently numbered six-packs, it would be easy to equip a unit train to serve your HO scale oil field or refinery.

Originally founded in 1891, Union Tank Car Co. was purchased by John D. Rockefeller's Standard Oil, then spun off as an independent company again when the government forcibly broke up Standard Oil in 1909. By 1920, the built date on our sample car, Union Tank Car was the biggest owner of tank cars in North America, with more than 20,500 itemized in the *Official Railway Equipment Register* (Railway Equipment & Publishing Co.).

The Class X3 tank was built in multiple versions, including 6,500-gallon, 10,000-gallon, and 12,000-gallon tanks, with one, two, or three domes. The most common variation was the 10,000-gallon single-dome tank, the subject of Rapido's model, with nearly 13,000 produced. Time eventually took its toll on these unassuming workhorses, but more than 1,000 lasted to the late 1960s.

Though it was most commonly used to carry petroleum products, the X3 occasionally hauled other liquids that didn't require special handling, such as vegetable oil.

First look. Rapido's X3 tank car is a great looking model. The rivets on the tank ends and dome are finely molded, the tank saddles and tie-downs are prototypically accurate, and the wire handrails and grab irons are close to scale thickness. The molded plastic K brake gear (appropriate for our 1920-vintage sample car; AB brakes are also offered where appropriate) was likewise well done.

The blackened metal semi-scale knuckle couplers were mounted at the right height and connected easily with various brands of couplers. The wheels, also blackened metal, were in gauge.

The black paint job was smooth and even, and the yellow lettering was opaque, straight, and legible – including the tiny safety information on the right side.

I found a dimensioned drawing of a UTLX Class X3 tank car in the 1922 *Car Builder's Cyclopedia* (Simmons-Boardman). The drawing was of a 6,500-gallon car, so the length differed from Rapido's 10,000-gallon model. But the other dimensions, as well as the placement and appearance of details, all matched up – even the brake gear.

Test run. To see how free-rolling the wheels were, I set the car on the rails at Skyridge, the highest point of our HO scale house layout, the Milwaukee, Racine & Troy. The slight grade on the trestle started it rolling without a nudge. It gathered so much speed going down the hill that I had to run to keep up. Had it not slammed full speed into a string of cars sitting in Marquette Yard before I could catch it, it probably would have made it all the way to east staging.

I also tested how well it would handle the no. 4 Snap-Switches, 18" radius curves, and iffy module gaps on our 2009 Beer Line project layout. It took them all like a champ, whether pushed or pulled, staying on the rails better than some of the cars I coupled it to.

The car weighs just 2.7 ounces, which is significantly less than the 3.5 ounces recommended by the National Model Railroad Association's RP-20.1. There's plenty of room for weights in the tank; perhaps the manufacturer didn't want to make the model top-heavy. Regardless, I don't think the weight will be much of an issue, since the car is so free-rolling.

One or many? Since these tank cars were so numerous and ran everywhere across the country for almost 60 years, if you model anywhere from the late steam to early diesel eras in HO, there's no question that your railroad needs these cars. The only question is how many.
– Steven Otte, senior associate editor

Facts & features

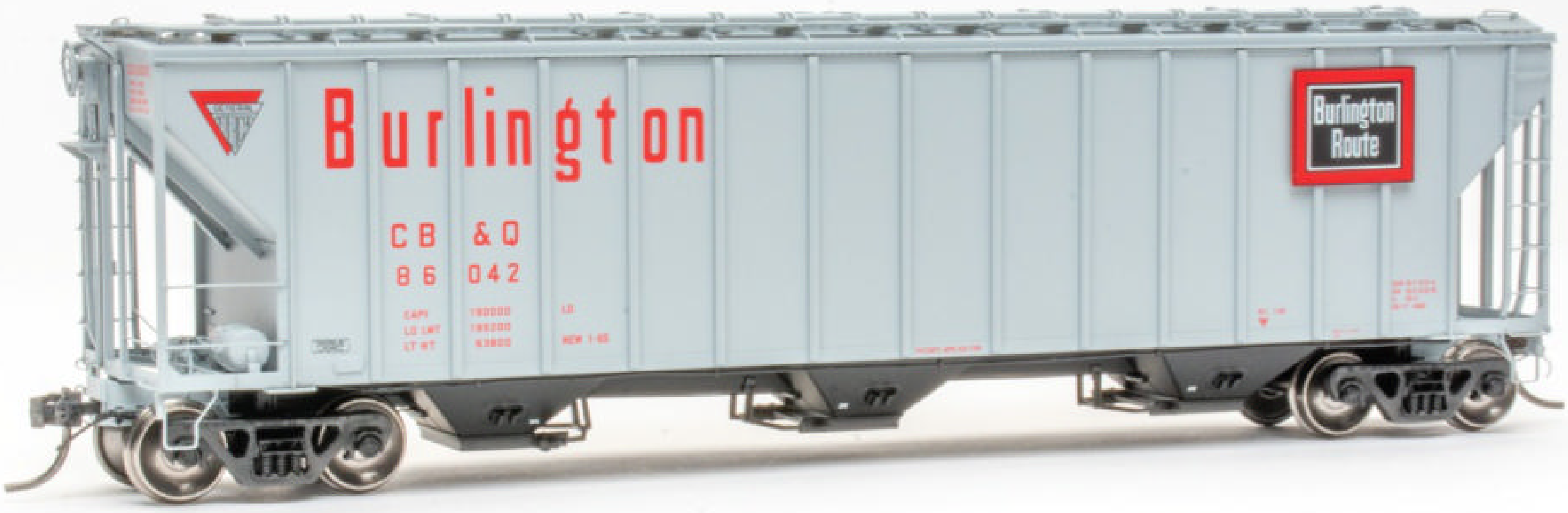
Price: single car, $54.95; three-packs, $164.85; six-packs, $329.70

Manufacturer
Rapido Trains Inc.
500 Alden Rd., unit 21
Markham, ON L3R5H5, Canada
rapidotrains.com

Era: 1920 to late 1960s

Road names: Union Tank Car Line (three schemes), Atlantic Refining, Eastman Chemical, Procor, Northern Pacific, Products Tank Car, and Seaboard Air Line. Single cars and multi-car packs available. Also available undecorated with K brakes (pre-1953) or AB brakes (post-1940).

Features
- Blackened metal wheelsets, in gauge
- Detailed, era-appropriate brake gear
- Semi-scale couplers, at correct height
- Weight: 2.7 ounces (.8 ounce under NMRA RP-20.1)
- Wire handrails and grab irons



Tangent HO GATC 4500 covered hopper

Near the end of a work day in early March, I received an e-mail from Tangent Scale Models. When I opened the message, I saw the company had released a General American Transportation Corp. 4,500-cubic-foot capacity three-bay covered hopper. I quickly exclaimed "Holy cow!"

The covered hopper, based on a prototype built between 1963 and 1966, has never been offered as a ready-to-run HO scale plastic model. Better yet, it's available in three body styles, all featuring wire grab irons, railroad-specific details, and metal corner stirrup steps.

Our review sample is decorated as Chicago, Burlington & Quincy 86042, part of the railroad's 85800 through 86199 series. The class LO-5A cars were built in 1965. They joined 100 class LO-5 covered hoppers (85700 through 85799) that were built a year earlier.

Facts & features

Price: $56.95
Manufacturer
Tangent Scale Models
P.O. Box 6514
Asheville, NC 28816
tangentscalemodels.com
Era: 1965 to 1990s (as decorated)
Road names: Chicago, Burlington & Quincy (January 1965 as-delivered scheme); Archer Daniels Midland (September 1966 blue scheme with CRDX reporting marks, six numbers); Atchison, Topeka & Santa Fe (1991 "Quality" repaint, six numbers); and Chicago Great Western (September 1966 as-delivered scheme). Twelve numbers per scheme unless noted. Also available undecorated in three body styles.
Features
- 36" CNC machined metal wheels
- Kadee scale couplers
- Weight: 5.1 ounces (.6 ounce too heavy per NMRA RP-20.1)

The CB&Q's western subsidiaries Colorado & Southern and Fort Worth & Denver also rostered GATC 4500 covered hoppers, numbered in the 860 through 869 and 3001 through 3050 series, respectively.

After the 1970 merger that created Burlington Northern, CB&Q and Great Northern (GN) GATC 4500 covered hoppers were assigned to the new railroad's 451050 through 451599 series. However, some of the cars in CB&Q paint stayed in their original colors into the early 1990s before being repainted.

The Tangent Scale Models car features an injection-molded plastic body with many separate, factory-applied parts. Starting on top, the covered hopper has see-through Apex running boards with L-shaped wire corner grab irons. The six-panel GATC hatch covers have wire hand grabs and locking knob detail. The upper and lower flange on the edge of the roof has fastener detail.

The sides of the CB&Q car have 15 exterior posts and a factory-applied BURLINGTON ROUTE placard on the upper right corner. Erie Lackawanna, GN, and Norfolk & Western were among other railroads to roster the 15-post version of the car.

Tangent also offers the GATC 4500 covered hopper with 13 exterior posts and body-mounted brake details. Atchison, Topeka & Santa Fe; Chicago Freight Car Leasing; and Chicago Great Western were other original owners of the 13-post car.

Similar to other Tangent covered hoppers, the car ends are well detailed. Both ends have braces on the slope sheets. The B end has freestanding brake appliances with related piping and a high-mount brake retainer. The absence of a brake cylinder is correct for the CB&Q car, as the full-size cars had truck-mounted brake cylinders.

Underbody details include Wine outlet gates with gear housing detail on one edge. The gates are correct for this car number. Cars 86185 through 86199 were fitted with pneumatic outlets.

The car rides on Barber S-2 trucks with correctly gauged 36" CNC machined metal wheels. The trucks have rotating bearing caps on the end (spares are included with the model). The truck brake beams on our sample have brake cylinders. Cars with body-mounted brakes do not have this detail.

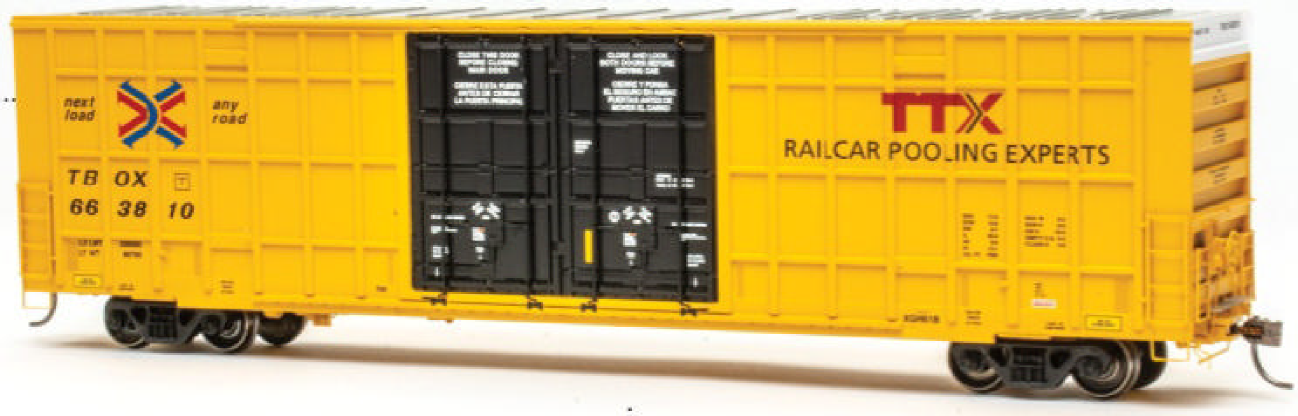
The covered hopper's dimensions closely followed prototype drawings in a Burlington Northern equipment book. The model is neatly painted in the as-delivered gray-and-black scheme. The lettering placement matches prototype images published in *Burlington Bulletin No. 20: Covered Hoppers*. Even the printed equipment trust plate in the lower left corner is legible. Nice touch!

I tested the car in a train on our Milwaukee, Racine & Troy staff layout. The car ran without incident on the main line and while in a cut of cars being switched on Jones Island.

The GATC 4500 covered hopper is a model I'd long hoped for in HO scale. Kudos to Tangent Scale Models for producing a well-researched, dimensionally accurate version of this car in multiple body styles. I'm hopeful the next run will include some cars in BN and GN paint to go with the CB&Q model. – *Cody Grivno, senior editor*

QUICKLOOK

Atlas HO scale Gunderson 7550 double-door boxcar



Price: $59.95

Manufacturer
Atlas Model Railroad Co.
378 Florence Ave.
Hillside, NJ 07205
shop.atlasrr.com

Road name: TTX (yellow and black, 12 road numbers). Also available undecorated.

Era: 2016 to present

Comments: A newly tooled modern-era HO scale boxcar has joined the Master Line from Atlas Model Railroad Co. The Gunderson 7,550-cubic-foot capacity double-door boxcar features injection-molded plastic construction and has see-through etched-metal crossover platforms, metal couplers, and many freestanding parts.

Our sample is decorated as TTX Corp. 663810, part of the leasing company's 663810 through 664998 series built by Greenbrier (Gunderson) in 2016. The car is part of the TTX XGH61B class. To translate, X = boxcar, G = Gunderson, H = hydraulic end-of-car cushioning, 61 = car length in feet, and B = subclass. The full-size cars are used to haul bulk goods and paper.

The Atlas model has a one-piece body with a separate underbody. The roof has X-panels on the ends and diagonal panels in the middle. Freestanding parts on the sides and ends include plastic door rods, ladders, and stirrup steps; crossover platform handrails; a brake wheel housing and brake wheel; and uncoupling levers.

The underbody has nailable steel floor detail. The center sill and crossmembers are a single piece. The body bolsters, bolster blocks, and draft-gear boxes are separate castings. Among the freestanding underbody details are the air reservoir, brake cylinder, control valve and related piping. Levers and hangers round off the underbody.

The boxcar is fitted with screw-mounted Barber S-2 roller-bearing trucks. The 36" blackened-metal wheels are mounted on plastic axles.

At 6.8 ounces, the boxcar is 1.5 ounces too heavy per National Model Railroad Association Recommended Practice 20.1. The model's dimensions follow data published on Greenbrier's website. The paint and lettering placement matches prototype photos.

The Atlas HO scale Gunderson 7550 double-door boxcar is a well-executed model. If your layout is set in the modern era, you'll want to get a few of these for your fleet. – *Cody Grivno, senior editor*

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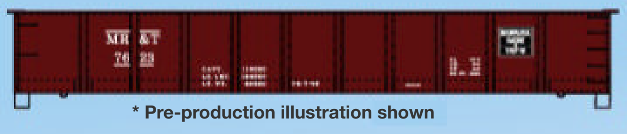

* Pre-production illustration shown

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By Jerry Dziedzic

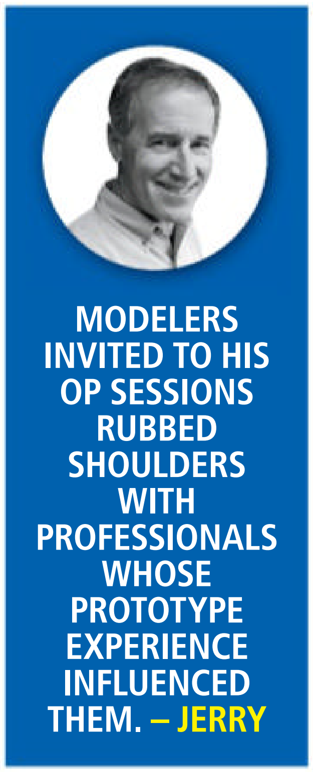
Johnny O and TTTO

A chapter closed on the ground-breaking Virginian & Ohio last October when it lost its founder, Allen McClelland, at age 88. Linear layout design for prototype operation was one of his marks on our hobby, and the V&O made him as highly regarded by modelers in the ’70s as Frank Ellison’s Delta Lines did in the ’40s. Allen’s passing prompted John Young, a regular reader, to inquire into the origins of timetable and train order operation (TTTO) as many model railroads practice it today. He interviewed many well-known modelers and shared his findings with me.

Allen’s layout was certainly not the first because it followed Centralized Traffic Control operation. *Model Railroader*’s digital archives haven’t revealed to me that Frank’s was, either. His Delta Lines made operation theatrical using timetable schedules to make meets dramatic by timing them carefully. This fit the timetable half of the bill, but Frank stopped short of train orders.

Al Kalmbach featured the earliest TTTO layout operation I found, the Brooklyn Railroad Club’s Dunwood Western Lines, in the July 1934 issue of *Model Rail-roader*. The story opened with a dispatcher dictating a train order: “19 East, copy two: Extra 427 East take siding PG and wait for 2nd 100 Engine 526.” We might quarrel with the order’s form, but Al explained that the club operates “in exactly the manner used on a real railroad.” Indeed, club members studied a Pennsylvania RR rulebook and passed tests to become eligible for operating assignments. However, I suppose few of today’s TTTO layout owners have heard of the Dunwood Western, far fewer inspired by it. If it wasn’t any of these, then who?

John’s detective work pointed to Jack Ozanich and his Atlantic Great Eastern (AGE). John N. Ozanich (o zan’ itch), Jack, or “Johnny O” to his friends, was a veteran Grand Trunk Western (GTW) engineer who retired from the top spot on the seniority list, second on the entire GTW system, on the railroad’s west end between Battle Creek, Mich., and Chicago. High seniority helps an engineer hold almost any job he likes, and Jack used his to wrap up his career with the Kalamazoo Turn, a switching job that worked five days per week with weekends off. Jack’s close friend Craig Wilson told me that people joked that Hunter Harrison, who headed Canadian National and its stateside GTW, had a red light on his desk that lit every time Jack found a job he liked so Hunter could abolish it.



MODELERS INVITED TO HIS OP SESSIONS RUBBED SHOULDERS WITH PROFESSIONALS WHOSE PROTOTYPE EXPERIENCE INFLUENCED THEM. – JERRY

Jack Ozanich poses as a dispatcher, complete with period shirt sleeve protectors, marking an entry on an AGE train sheet. His left arm rests on an order book. GTW rulebooks and a copy of Josserand’s *Rights of Trains* are at his fingertips. Craig Wilson photo

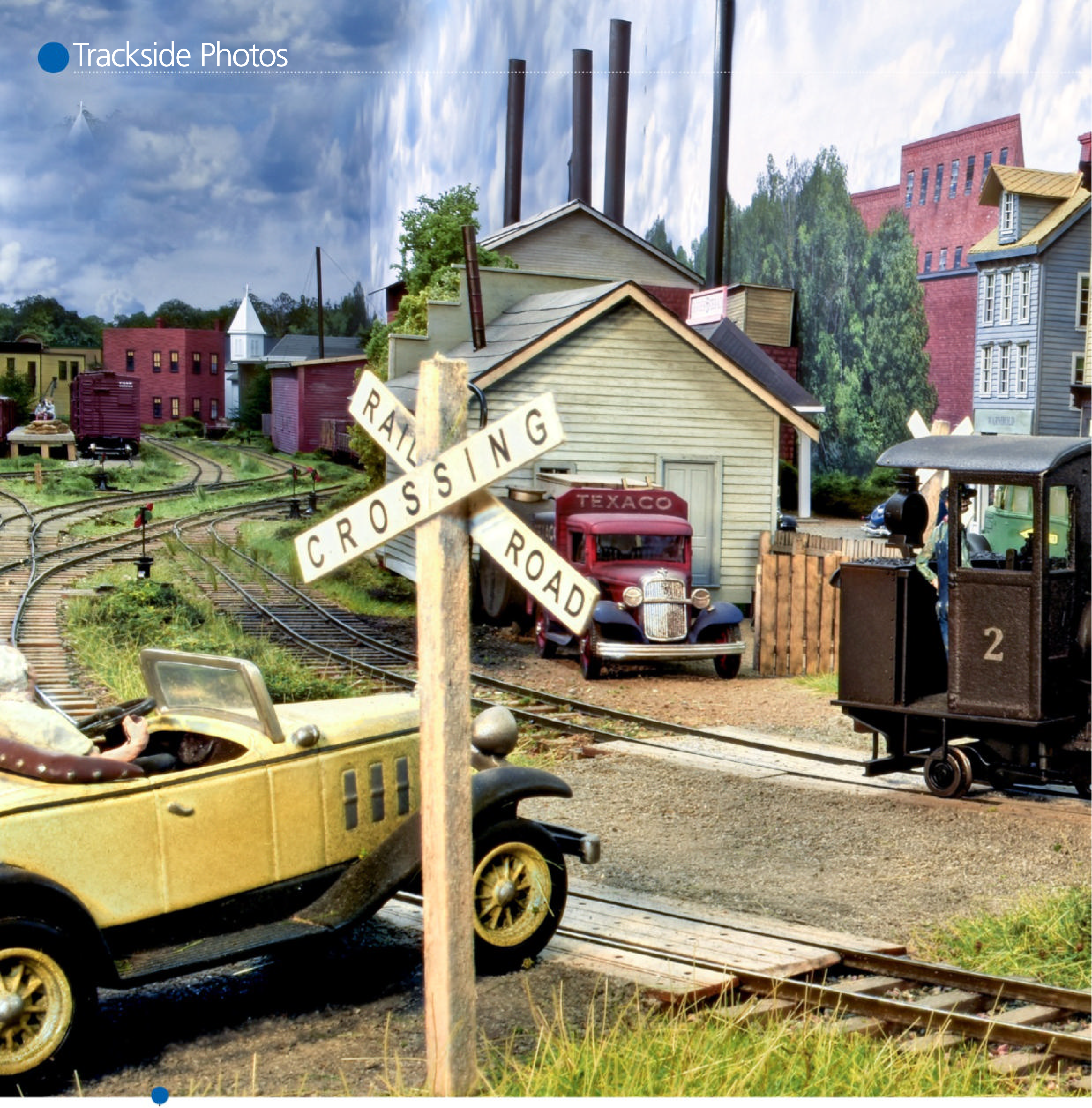
The Atlantic Great Eastern was Jack’s rendition of full-on prototype operation based on actual GTW rules and practices. A vacation in New England made him fond of the region’s scenery and railroads, inspiring the AGE’s setting. He began TTTO operation on his first model railroad in Paw Paw, Mich., in the early ’70s and continued it when a new home in Battle Creek brought operations on his HO scale AGE to full fruition.

Jack made the AGE come alive with his prototypical railroading experience. This attracted other railroaders to his crew, so modelers invited to his operating sessions rubbed shoulders with professionals whose prototype experience influenced them in turn. How well I remember taking the throttle of a BNSF locomotive simulator under Jack’s tutelage! He enriched the experience with more colorful language than almost any human can, especially when a fuel truck trying to beat the train to a railroad crossing appeared on the simulator screen.

Jack enjoyed playing separate roles during his sessions, from genial host to gruff trainmaster modeled after Dan Thorn, the prickly official in the film *Danger Lights*. He enhanced authenticity by using AGE seniority lists to award jobs and adding such detail as actual weather records so proper entries could be made on the train sheet. He dressed for the part for this photo.

Observing that so many operators credited Jack for making TTTO as popular as it has become, Harold Krewer remarked: “If we were making an epic motion picture about model railroad operation, Jack would be our Moses bringing the tablets down the mountain.”

Special thanks to John, who suggested this topic and collected background information which helped me put this article together. MR



Laurium, Mohawk & Brockway trench locomotive No. 2 is switching Jeruzal Hardware at Laurium on a sunny summer day. Larry Burk of Holly, Mich., photographed the action on his freelanced On30 layout. The locomotive is a Bachmann model fitted with a cab from Lambert Locomotive Works. Larry's layout was featured in the November 2020 *Model Railroader.*

Conducted by Steven Otte

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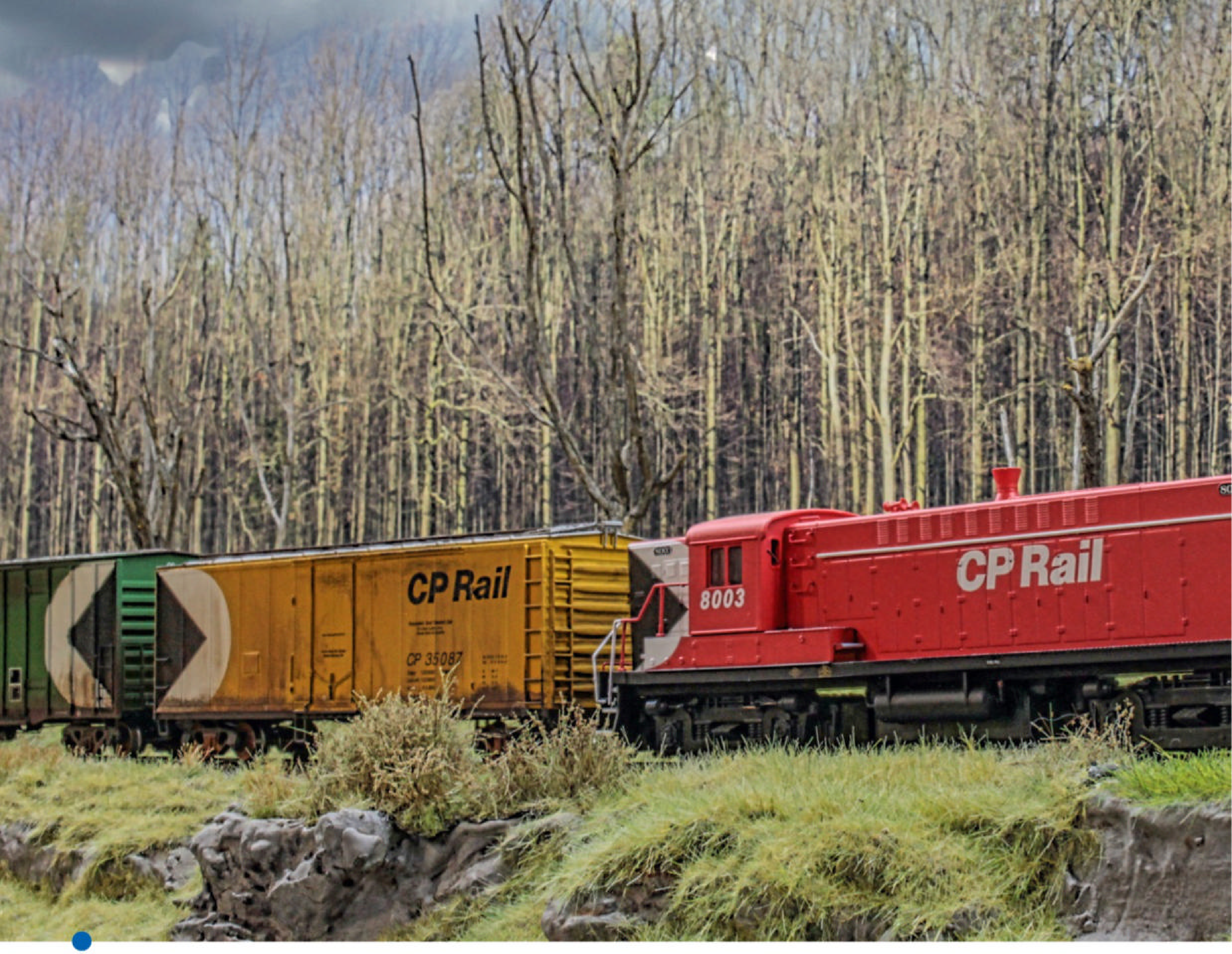
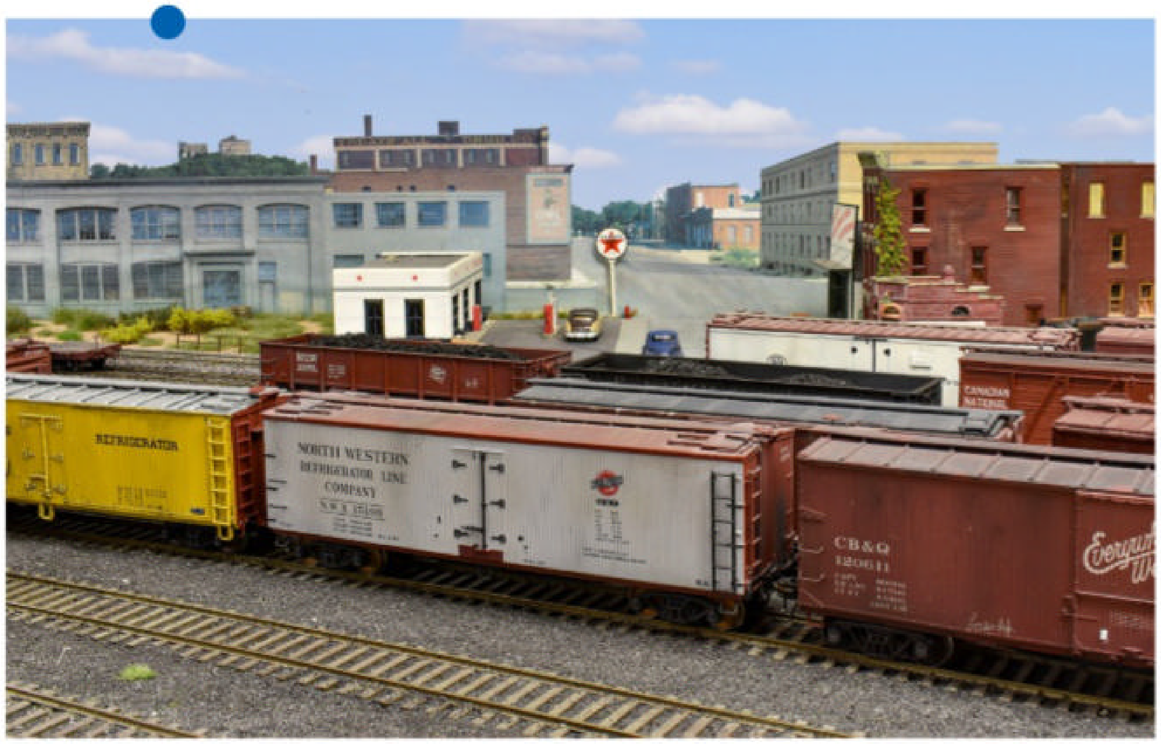


On a cold day in November, CP Rail No. 8003, a Baldwin DRS4-4-1000, is heading for Hawkesbury Yard with a freight in tow. Lloyd Henchey of St. Eugene, Ont., Canada, shot the photo on his HO scale model railroad. Lloyd built the trees from sagebrush branches. The DRS4-4-1000 is a Bowser model.

Blue Ridge Southern Train T31 works its way through the mountain valleys of western North Carolina en route to the large paper mill in Canton. Kinzer Hurt of Brevard, N.C., custom-painted and detailed the HO scale ScaleTrains model. The early-winter scene takes place in a vignette in his layout, the rest of which is set in summer. The background mountains are photos taken in the French Broad River valley near Brevard.

It's spring 1953, so most of the consumer goods destined for stores in Minneapolis, Minn., come in via rail. Here, Minneapolis & St. Louis' Middle Yard is full of freight cars ready to be switched into local trains and taken to their final destinations. This scene is on Joe Binish's HO scale Central of Minnesota layout, which models industrial switching in Minneapolis. Richard Remiarz shot the photo.



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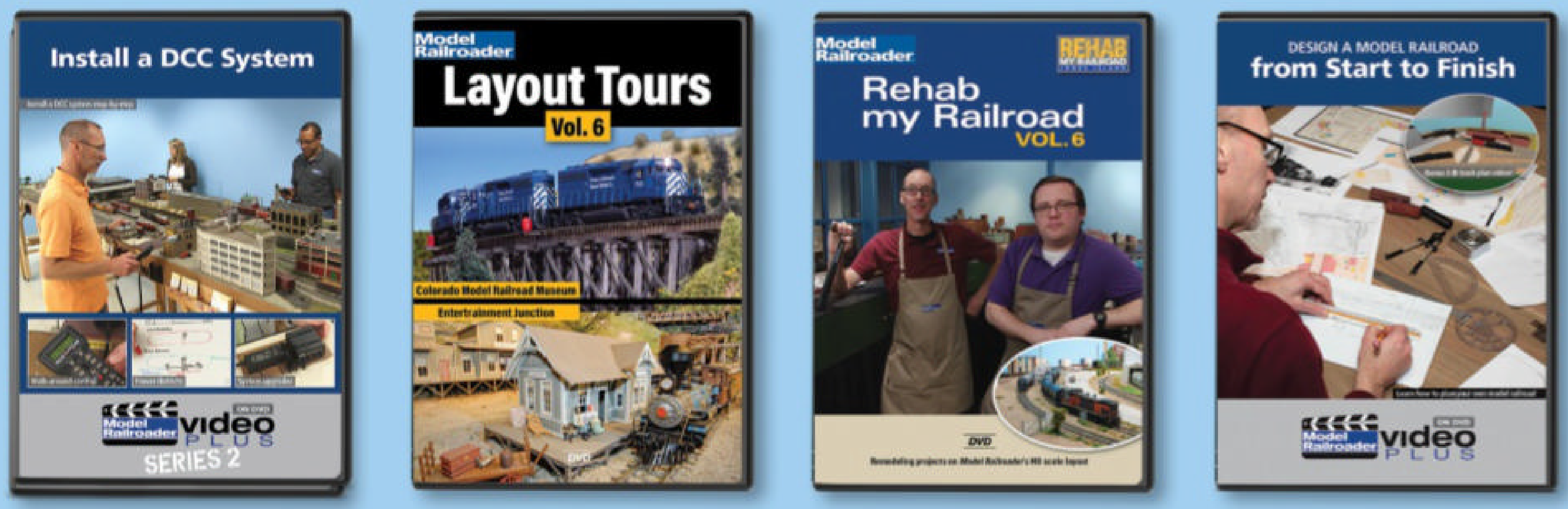
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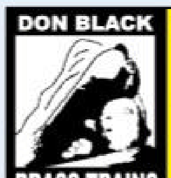

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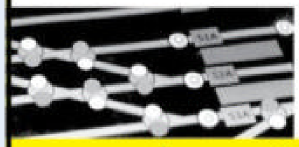

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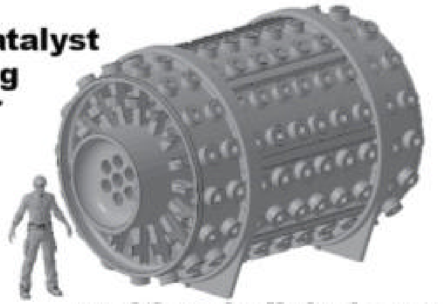

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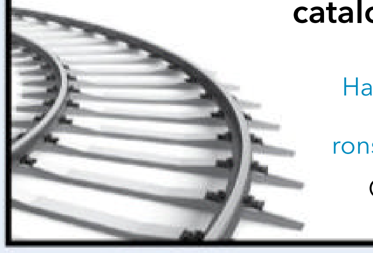

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All ads must be prepaid and pertain to the subject of model railroading.

Schedule of Events

AZ, FLAGSTAFF: Grand Canyon Special 2023 NMRA PSR Convention. June 7-11, 2023. High Country Conference Center. 201 W. Butler Ave., Flagstaff, AZ 86001. Private chartered train from Williams, AZ to the Grand Canyon. Plus, tours of the Grand Canyon Railroad engine shop, modeling clinics, layout tours, operating sessions, auction, and more! Registration website: PSRconvention.org

AZ, GLENDALE: ARHS Model Train Swap Meet. Glendale Christian Church, 9661 North 59th Ave., Glendale, AZ 85302. Saturday, May 13, 2023, 9:00am-1:00pm. Everything Trains – Food – Fun. Admission $5.00. Tables $25.00 - to sign up send check or money order to: ARHS, PO Box 5816, Glendale, AZ 85312-5816. Contact: Craig Faris, 623-340-3529

CA, SACRAMENTO: Sac-Sierra TCA. Scottish Rite Masonic Center, 6151 H Street, Sacramento, CA 95819. Saturday, May 27, 2023, 10:00am-3:00pm. Admission $10.00, children 12 and under free. 160+ tables of trains for sale, free parking, operating layouts, food. Free train set drawing for 17 and under. Contact: Bryan Stanton at brsta@comcast.net

FL, MELBOURNE: The Melbourne Train and Toy Show. Azan Shrine Center, 1591 West Eau Gallie Blvd, Melbourne, FL 32935. Saturday, June 3, 2023, 9am-2pm. Admission: $5, kids under 10 FREE. Vendor tables $25 each or 3 or more $20 each. Join us for trains, toys, and fun! Lunch/snacks available. For more information: SchultzSpaceCoastTrains@aol.com or 321-805-1963

FL, OCALA: Lions Tri-Annual Train Show. First Christian Church, 1908 E. Fort King St., Ocala, FL 34471. Saturday, June 10, 2023, and November 4, 2023, 9:00am-2:00pm. Model trains, accessories, detail parts, toys. Adults $5.00, 12 and under free w/adult. Bring two canned goods and receive $1.00 off admission. Food/snacks available. Information: Bob 352-694-6381 or 813-203-3216

FL, TALLAHASSEE: 32nd Annual Tallahassee Model Railroad Show and Sale! 2-DAYS! June 24-25, 2023. Saturday, 9:00am-5:00pm & Sunday, 9:00am-4:00pm. Leon County Fair Grounds, 441 Paul Russell Rd., Bldg. 2 & 4. Admission: Adults/Children 13 & over, $10 BOTH DAYS! Scouts in uniform/children 12 & under FREE! SCALES Z-G! FOOD! Contact: Andy Zimmerman, 850-524-4399. Email: GNTrainman@comcast.net

IL, GALESBURG: 2023 Galesburg Train Show. June 24-25. Saturday 10am-4pm, Sunday 10am-2pm. Knox College, T. Fleming Fieldhouse, 199 East Knox Street. Admission $5, under 12 free. 400 tables of model trains, books, videos, t-shirts, memorabilia. 80+ vendors and exhibitors. Operating layouts. Tables: $30 each. Refreshments available. Handicap accessible. Show Directors: Greg Norris 309-335-2634, John Manderscheid 563-349-0134

IL, GREENVILLE: American Heritage Railroad Train Show @ American Farm Heritage Museum, 1395 Museum Ave., Greenville, IL 62246. I-70 @ IL Rt. 127 (Exit #45). Saturday, June 10, 2023, 10:00am-4:00pm. Admission: $5.00, under 12 FREE. Train ride with paid admission. Operating layouts. Dealers welcome, $15.00 per table. Contact Jim @ 217-825-6230.

IL, ST. CHARLES: 47th Annual Kane County Railroadiana and Model Train Show. Kane County Fairgrounds, (Front Building), 525 South Randall Rd., St. Charles, IL 60174. Sunday, June 11, 2023, 10:00am-3:00pm. Admission: $6.00 (includes tax). Children under 12 FREE. Tables starting at $65.00. For information: 847-358-1185, RussFierce@aol.com or www.RRShows.com

KS, HUTCHINSON: Kansas Central Model Railroaders, Center of the Nation Model Railroad Expo. Kansas State Fairgrounds, Pride of Kansas Building, 2000 N Poplar, Hutchinson, KS 67502. June 3-4, 2023. Saturday 9am-5pm, Sunday 10am-3pm. Admission $8.00, under 13 free w/adult. 125+ vendor tables & numerous operating layouts. 25,800 sq.ft. of fun! Free parking (handicap accessible). Info: www.kansascentralmodelrailroaders.org

NE, DESHLER: Train Show & Open House, July 8-9, 2023. Thayer County Activity Center, 4th & Race St. Hours: Saturday, 9:00am-5:00pm, Sunday 10:00am-4:00pm. Clinics, custom vendors, layouts, and manufacturers. Admission $6.00, under 12 FREE. Extended hours at Spring Creek Model Trains. 304 E. Bryson Ave., Deshler, NE 68340. Details: www.springcreekmodeltrains.com

NJ, BRICK: ECTP and Collectibles LLC presents The Brick Train Show. Elks Lodge, 2491 Hooper Avenue, Brick, NJ 08723. Sunday, May 21, 2023, 9:00am-2:00pm. Admission: $7.00; under 12 free with adult. John LaLima 732-845-5966. Go to www.eastcoasttrainparts.com and click on The Brick Show.

TN, JOHNSON CITY: BIG TRAIN SHOW, June 2-3, 2023. Host: George L. Carter Railroad Museum. 330+ tables, 64,000 sq.ft. All scales, operating layouts, vendors, memorabilia, books, food. ETSU "Mini-Dome" Noon-6pm Friday, 10am-4pm Saturday. Admission: $8 per day, under 12 Free. Free covered parking. Contact Roger Teinert 423-791-4937 or www.etsu.edu/railroad

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WI, LA CROSSE: Rail Fair, Copeland Park, Rose & Clinton Streets. Saturday, July 15, 2023, 10am-4pm. Admission $5.00, under 12 free with adult. Railroad Show–Flea Market–Swap Meet. BUY/SELL/TRADE. Model, Toy & Antique Trains & Memorabilia, Railroad Exhibits & Displays. Information: 4000 Foundation, PO Box 3411, La Crosse, WI 54602, 608-781-9383 or 608-498-9522. www.4000foundation.org

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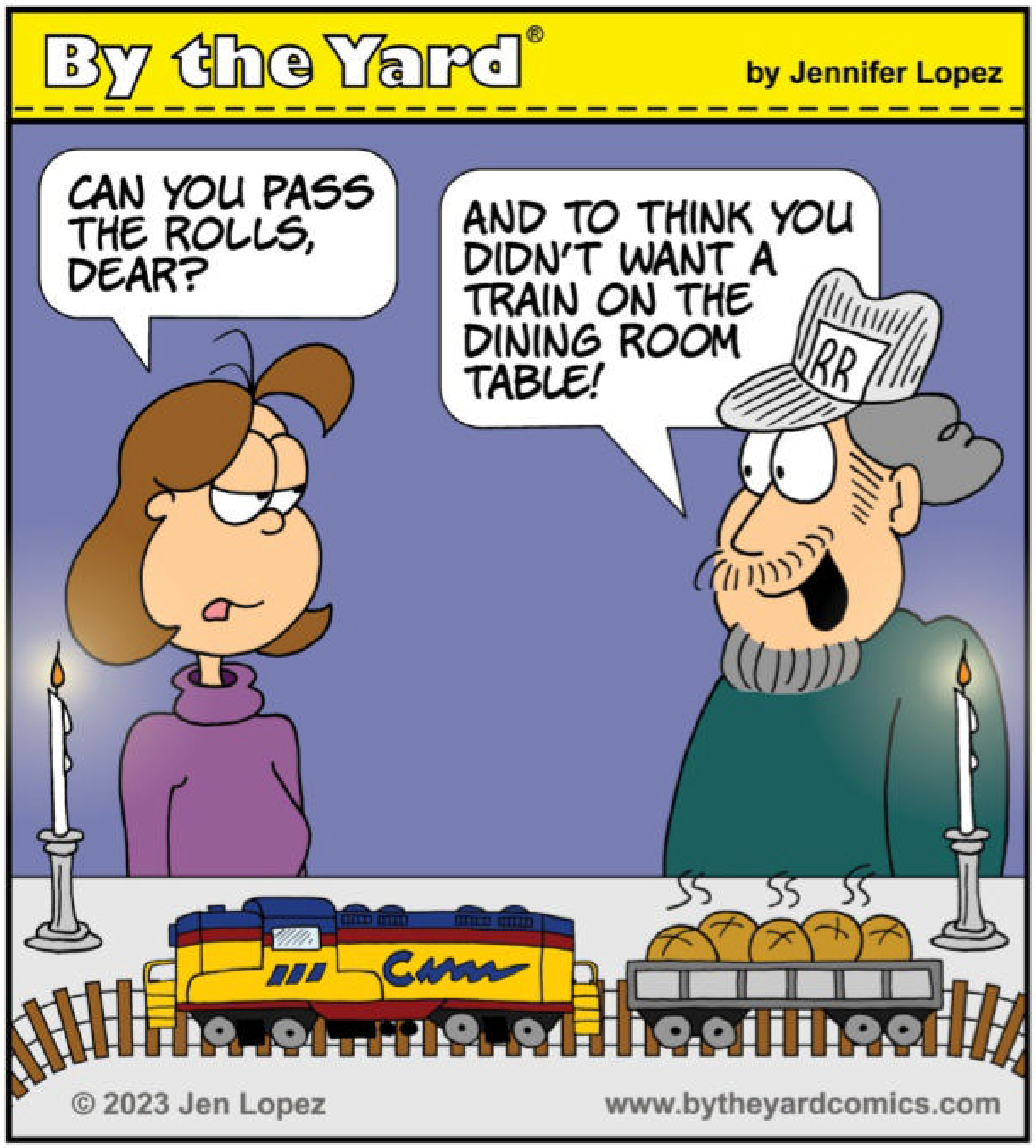
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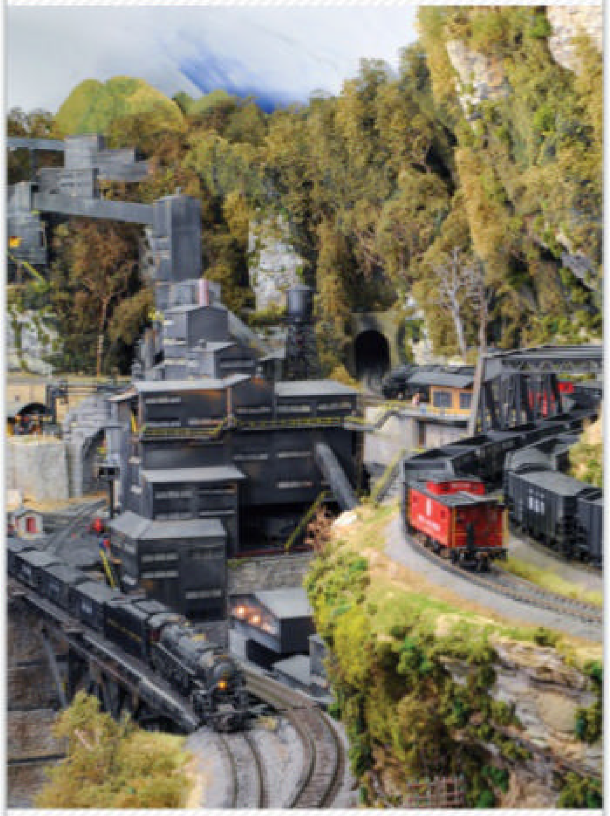

Next Issue

Steaming through coal country

Through the clever use of mirrors and a cathedral ceiling, photographer Dave Wendt's HO scale 12 x 25 foot Norfolk & Western layout appears much larger than the space that it occupies.

Extending the fun

Dave Abeles endorses the benefits of a group "setup night" prior to an operating session, allowing for more prototypically accurate operations and improved camaraderie.

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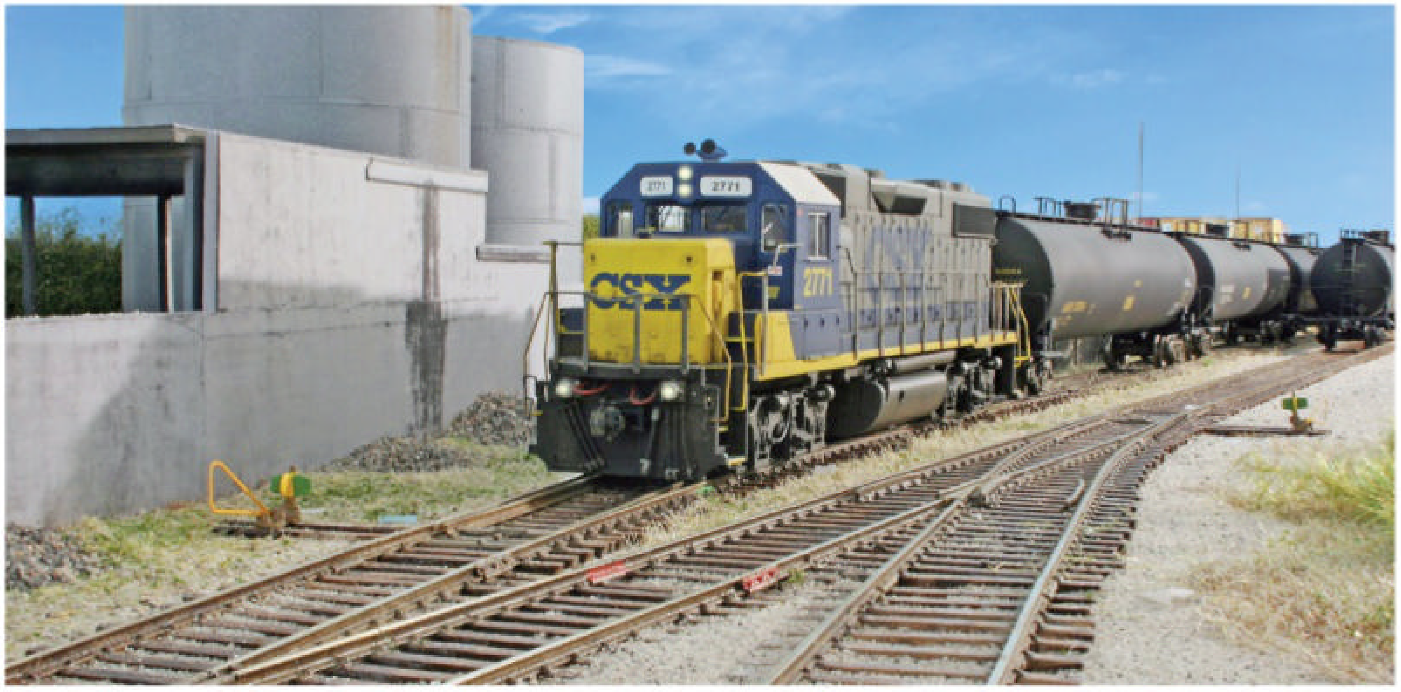
By Tony Koester

Beginning with the end in mind



CSX GP38-2 No. 2771 works Sungas on Lance Mindheim's HO scale Downtown Spur. Although this LPG dealer has only two turnouts and no tricky trackage, it still dishes out about 10 minutes of operating fun. Two or three industries like this, plus travel time between them, adds up to a 30-minute-plus operating session pretty easily. Lance Mindheim photo

It's always a good idea to listen to those who have more experience than we do. That means we should be doing a lot of listening. One of my favorite gurus is layout designer/builder and good friend Lance Mindheim. John Moenius of Kansas City recently reminded several of us on a chat group of one of Lance's pearls of wisdom: It's a good idea to begin track planning with the end in mind. For many, that means thinking about what an operating session will look like.

Lance always asks clients of his layout-building business how they will operate. How often? By themselves or in formal sessions? How long will the sessions last? The most common answer is that people will run trains fairly regularly, by themselves, for about 30 minutes. If a session is about a half hour, it doesn't take much track to keep busy. Less track means more space for a better appearance.

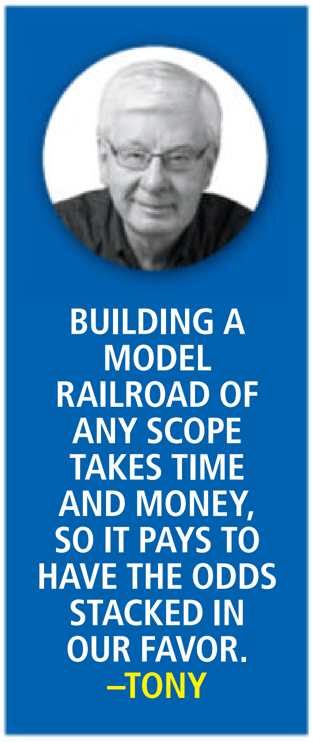
"We are looking to relocate to the sunny Southeast – no-basement territory," John commented. "So my next layout may be an around-the-walls bedroom shelf layout. This actually works for me, as I find maybe at most an hour of operation is just fine. I thought my next layout would be the granger type: elevator, fuel dealer, coal, lumber, etc. Since I would have space for only one town, this might be somewhat limiting.

"I've given a lot of thought to a small layout based around just a freight house and team track," John continued. "Eric Hansmann has made some excellent posts on his blog regarding this type of operation. This also works for my newfound interest in building freight cars, specifically a lot of 40-foot boxcars."

John concluded by noting that "I've always liked the Seaboard Air Line, although I can't explain why exactly. My only connection to the area is throwing the Army's stuff out the back end of a C-130 at Fort Bragg. The Seaboard came in from four directions, plus connections with maybe three other railroads. I see a fiddle yard with sorting tracks on one end of the shelf, freight house on the other. I'm still working on how many sorts at the freight house per day. This is also close to where we want to move, somewhere between Savannah and Charleston."

Clark Propst, who has written about his HO railroads in *Model Railroad Planning*, builds on Lance's suggestion: "Imagine what the entire layout will look like when finished so you will have space for all the 'auxiliary' structures and know how the scenery will set the scene."

We disregard such sage advice at our own peril. Building a model railroad of any scope takes time and money, so it pays to have the odds stacked in our favor before we venture too far out into the swamp. It's not that building a model railroad is difficult; it's that we become discouraged and decide that it is.



BUILDING A MODEL RAILROAD OF ANY SCOPE TAKES TIME AND MONEY, SO IT PAYS TO HAVE THE ODDS STACKED IN OUR FAVOR.
–TONY

Having a plan on paper or a computer screen is not absolutely necessary for success. Some of us have built rather complex model railroads having never drawn a track plan. Not having a clue as to your destination as you begin erecting benchwork is almost certain to erect needless barriers to success.

A hobby is something we do to escape the trials and tribulations of the rest of our lives. It should be enjoyable and rewarding. It should not impose undue burdens on our already complex daily routines.

Conversely, scale model railroading is a rather complex endeavor. You can simplify it to a degree by using snap-together track, ready-built structures, and ready-to-run rolling stock and locomotives. Digital Command Control has simplified much of the wiring while allowing multiple trains to be controlled by more than one operator.

Beyond that, however, the tasks start to pile up. Taken one at a time, they're not onerous, but when viewed as a whole – benchwork, tracklaying, wiring, backdrops, scenery, structures, weathering rolling stock and locomotives, lighting, and perhaps adding working signals – they may look overwhelming.

So we go back to Lance's advice: Move ahead methodically with the end in mind. Don't overdo it. It's a hobby, so be sure to take time to enjoy the process. MR

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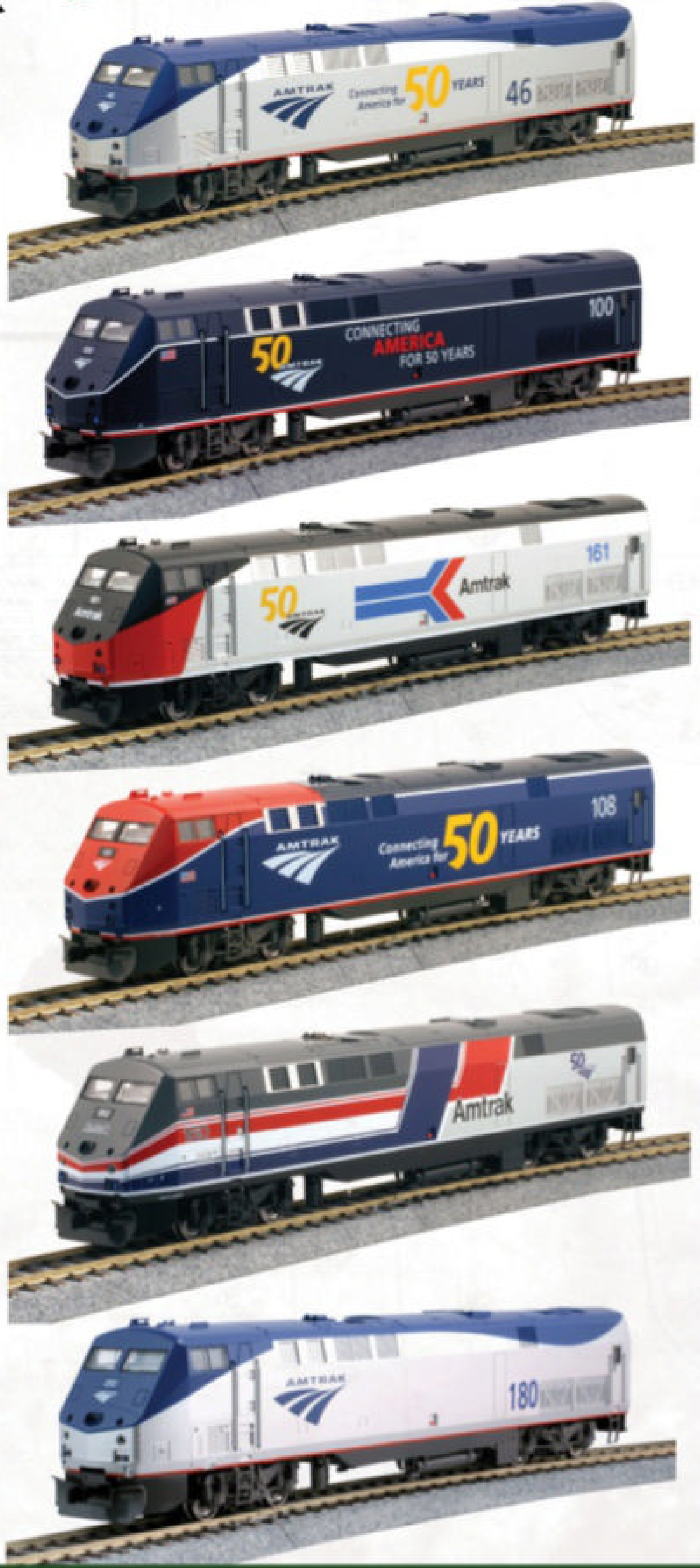
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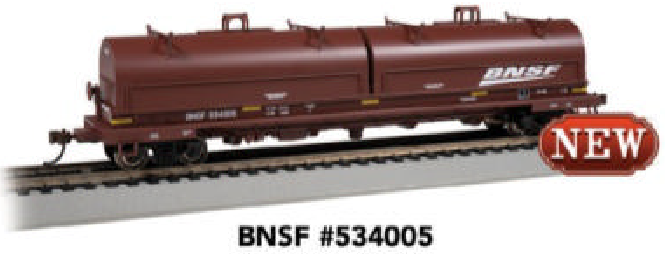

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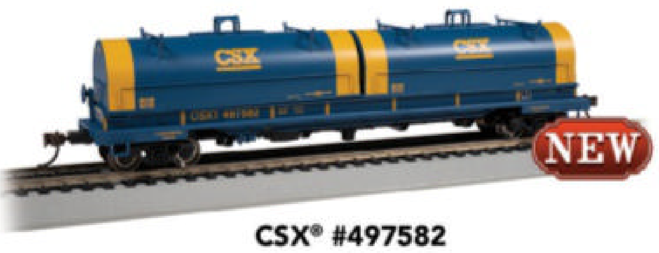

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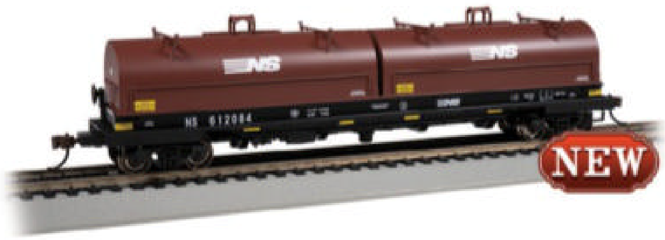

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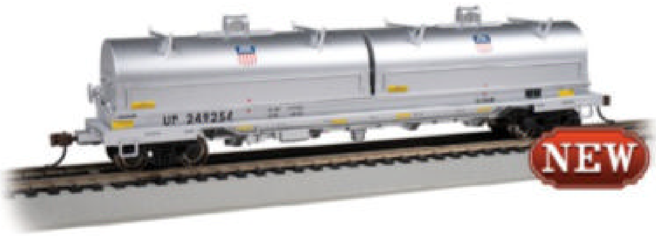

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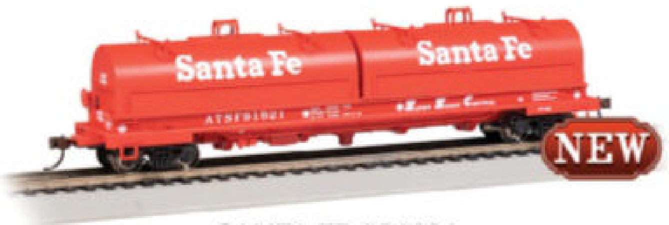

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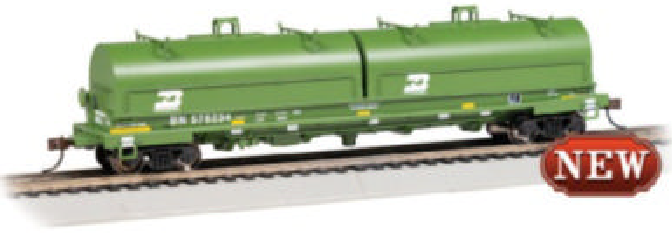

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